DOCUMENT RESUME

ED 068 065 HE 003 518

AUTHOR	Hamblin, John W.; Alcorn, Bruce K.
TITLE	Computer Facilities for Instruction in Small Colleges: Final Report Summary 1968-71.
INSTITUTION	Southern Regional Education Board, Atlanta, Ga.
SPONS AGENCY	National Science Foundation, Washington, D.C.
PUB DATE	[72]
NOTE	94p.
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Colleges; *Computer Assisted Instruction; Computers; Educational Innovation; Educational Research; *Educational Technology; *Higher Education; Instructional Innovation; *Instructional Technology; Program Evaluation

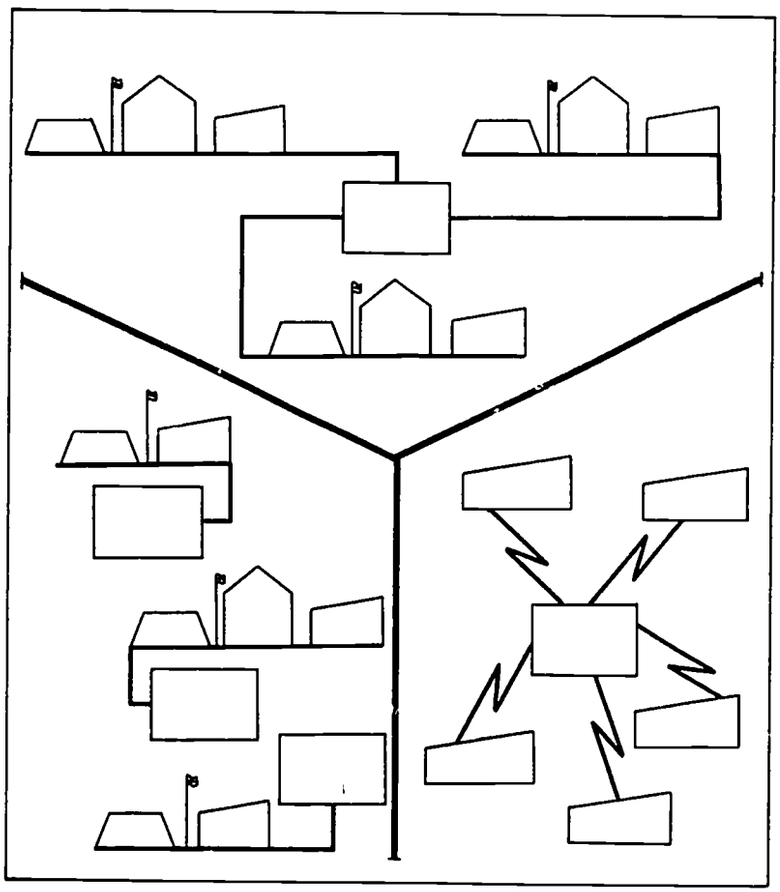
ABSTRACT

In August 1970, the National Science Foundation funded a program to study the advantages and disadvantages of low-cost mini-computers as instructional devices at 10 small colleges. The small colleges involved in the experiment have demonstrated that a computer facility can be used to considerable advantage in the instruction process, and students and faculty alike are highly enthusiastic about the uses to which the computer can be put. It was found that strong support from administrators is sufficient to get the hardware on campus, but faculty support and interest are necessary for the equipment to be utilized. The successful utilization of computer facilities on a college campus is to a great extent dependent on the leadership, enthusiasm, and outlook of the personnel in charge of such facilities. In fact, personnel seem to be more important than size, type, or even reliability of the facility. (Author/HS)

COMPUTER FACILITIES FOR INSTRUCTION IN SMALL COLLEGES: FINAL REPORT

National Science Foundation Grants 269-275, 277-280, 330, 404-406, 417, 481, 664-667

Coordinated By: Computer Sciences Project | Southern Regional Education Board



Computer Facilities for Instruction in Small Colleges: Final Report Summary*

1968-71

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*This a summary of a report for 1968-71 on an "Experiment On Ways Of Supplying Computer Facilities To Small Colleges For Instructional Uses," supported by NSF Grants 269-275, 277-280, 330, 404-406, 417, 481, 664-667.

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Preface

The reader should be cautious in interpreting the data contained in this report. The emphasis is placed on utilization of the different types of computer facilities for instructional purposes. Research and administrative uses are referred to only in the context of totals, be they costs, computer hours, or facility staff work loads. The reader should keep in mind the following as he reads this report:

1. The initial thirteen participating institutions had little or no computer use experience prior to July 1, 1968, and the later seven had little or none prior to July 1, 1969.

2. The "first year" of computer use covered by this report varies from six to eleven months, whereas the "second" and the "third" years cover full twelve month periods.

3. The character of the institutions differs considerably (see Figure 2.2).

Introduction and Summation | 1

Background:

During the late spring of 1968 the Office of Computing Activities of the National Science Foundation funded ten experimental projects aimed at obtaining guidelines for future support of computer facilities in the nation's 2500-plus institutions of higher education. As of June 30, 1969, only an estimated 1255 of these institutions had computer facilities of any kind available for use by their faculty and students. Because of the tremendous costs involved large sums must be expended if the colleges are to come close to meeting the challenge of the 1967 report of the President's Advisory Committee. An NSF supported survey conducted by the Southern Regional Education Board estimated that for the fiscal year 1968-69 higher education institutions in the U.S. expected to utilize 276 million dollars worth of computer facilities for research and instructional uses alone. A conservative estimate for administrative uses of computers for the same period is another 50 million dollars.

The stored program electronic digital computer has become such an integral part of college and university research, instructional, and administrative activities that most universities or colleges over 4,000 students have at least one. The larger colleges and universities are obtaining computers which can service many stations by direct input devices or visual display devices similar to TV consoles. Computer-communication systems are becoming extremely flexible and adaptable to almost any need or circumstance, anywhere, at any time. These systems can be as available as the telephone if the telephone circuits are in good condition.

The computer-communication systems now in use permit colleges and universities to concentrate their processing power and required technical staff, yet at the same time decentralize input-output stations to the offices and laboratories where the data originate. Intrauniversity cooperation is necessary to support these complex systems.

Interinstitutional cooperation in utilizing a computer-communication system will be attractive since small colleges can have a terminal from nearby university computer-communication systems as easily as an additional office or laboratory on the larger campus if the telephone circuits are in good condition. Similar systems are being installed in the data centers of computer companies and other agencies in the major cities. Nearly every major city has one or more of the computer-communication systems available for time-sharing by small businesses, laboratories, and educational institutions.

Since this project was initiated, another alternative for acquisition of computing capability by the small college has become a practical reality. Low-cost general purpose computing systems can now be purchased in the $12,000 to $75,000 range. This new breed of computers, commonly referred to as mini-computers, is expected to offer the small colleges a greater variety of educational computer uses than was previously available due to the high costs.

In August 1970 the NSF funded a three-year experiment to evaluate the advantages and disadvantages of this low-cost approach to instructional computing service. This new investigation involves ten small colleges in seven states and is also coordinated by the Computer Sciences Project of the SREB.

Objectives:

To make wise decisions with regard to providing computer facilities for their faculties and students, administrators of colleges need answers to questions such as the following:

1. At colleges alike in curricula, student body make-up, etc., what percent of the students by year and major will show interest in computer instruction under different settings or methods of operation, e.g., terminal versus small computer, small computer on campus versus small computer nearby?

2. Which operating practices or teaching techniques proved most successful, e.g., availability of computer, tutorial assistance?

3. What are the real costs of each of the programs per student credit hour?

4. Do attitudes of staff and students toward computers change because of the presence of the computer facility?

5. When minimum necessary usage of a terminal for adequate instruction has been established, how large a factor do communications costs become if distance exceeds 50 miles?

6. How much terminal time is required per student in different kinds of courses? Are there planning techniques which can reduce terminal (or computer) time required without harming the adequacy of the institutions?

7. Are there any special considerations relative to computer instruction in the developing institutions?

Summation:

Caffrey and Mosmann, in *Computers on Campus*, (American Council on Education, 1967), sum up very well the characteristics of a healthy college computer facility:

The most highly regarded centers seem to have emerged in situations in which both administrators and faculty feel strongly that the computer and its functions are a vital part of the whole educational program, in terms of both content and methodology. Such integration seems to be most evident when the president and the top leadership of the institution take the lead in establishing objectives and standards—and especially attitudes.

Observations of the project staff strongly endorse this view, especially its reference to the role of "both administrators and faculty."

The small colleges involved in the experiment have demonstrated that a computer facility can be used to considerable advantage in the instruction process. Students and faculty alike are highly enthusiastic about the uses to which the computer can be put. Deans and presidents of some colleges have become involved in matters relating to the operation of the facility and have encouraged curricular innovations to bring the computer into the instruction process.

It is noteworthy that all of the institutions plan to continue computer utilization at a level equal to or greater than that reached by the end of the experiment. Many concur they would be loath to function without the facilities. As of this writing, plans for the 1971-72 year can be summarized as follows:

Basically the Same—Wofford, Huntingdon, Mississippi Valley State (plans are in the making for a larger system), Murray State, Huston-Tillotson (the budget will be the unexpended NSF funds), George Peabody, Eastern Mennonite, and Atlanta University Center Corporation.

Some Changes—Queens (fewer student assistants), Xavier (add another cardpunch, proposed addition of external disk, 1403 printer, and staff consultant), Centenary (loss of programmer), Fairmont (addition of communications adapter to tie the 1130 to W.V.U.'s 360/75, another terminal, and more space), Transylvania (addition of another cardpunch and cardpunch operator for administrative work).

Major Changes—Loyola (purchase of PDP-11), Maryville (purchase of H-P 2114B as part of NSF grant), Millsaps (purchase of PDP-8/E).

Strong support from administrators is **sufficient** to get the hardware on campus, but faculty support and interest are **necessary** for the equipment to be utilized. Based on our experience, we urge administrators not to acquire, nor permit the acquisition of, computer facilities unless first, there is strong interest expressed by several faculty (current or recruited) and second, at least one faculty member is willing to spend as much time as is necessary (with release from other duties, of course) to promote the use of the facilities by teaching and assisting other faculty to program and to use the facilities.

The successful utilization of computer facilities on a college campus is to a great extent dependent on the leadership, enthusiasm, and outlook of the personnel in charge of such facilities. In fact, personnel seem to be more important than size, type, or even reliability of the facility.

Conclusions:

I. **Problems.**

A. Processing delays. The delays were due to a number of causes, including hardware and/or software failures, slow printers, insufficient number of terminals or cardpunches, increased usage, and delayed equipment installation. Soon after initiation of the project, many institutions discovered that demand exceeded the limits of the available input equipment. By the expiration of the experiment, seven additional terminals and twenty-one additional cardpunches had been obtained.

B. Personnel. Problems related hereto involved a shortage of staff (including an underestimation of the time required to manage a terminal facility), a lack of faculty with an understanding of the usefulness of computers and/or ability to use them, unauthorized telephone calls with the terminal communications equipment, and vendor contracts.

C. Application packages. A glaring need for computer-related curriculum materials exists.

D. Physical facilities. Inadequate housing was a common problem.

II. **Comments from institutions.** Some comments from the participating institutions were repeated so frequently that they merit listing here in a distilled form. (For more detailed comments, see Chapter 6.)

A. Students, especially science students, have become computer-oriented; many learn programming before signing up for formal courses; they feel computer knowledge has made them more valuable in the job market.

B. Several colleges are considering the purchase of a mini-computer; some have developed a required course in computer science.

C. Administrators are highly appreciative of the uses to which the facilities have been put and anticipate increased use of the installations after termination of the NSF funds.

D. An immediate need is felt for texts, lab manuals, and other instructional materials providing problems which can be solved on the computer.

III. **Quantitative data.** (For statistical details, see Chapter 9.)

A. The number of students participating increased at most of the colleges with a high increase of about 200%.

B. Overall the percent of faculty who participated did not change appreciably during the project.

C. The average total computer use for instruction and research only in console hours per month by the end of two years ranged from three to 149 or from one percent to 42 percent of capacity based on a maximum (conservative) two shift operation (352 hours/month). Even by the end of the third year the single highest utilization for research and instruction only reached 70 percent of capacity. When administrative uses were included the percent utilization reached 70 percent at another institution.

D. Costs per participating student are still inflated as compared to similar costs at centers which are several years old. However, total costs do represent good measures of "start up" costs for the different types of facilities included. Second year total costs for all of the colleges increased 21 percent while costs per participating student showed a 33 percent decrease. As computer use becomes greater the operation of the facilities becomes more efficient and unit costs will tend to level. This leveling can be expected when the facilities approach two full shifts of usage and may not occur before the fourth or fifth years of operation. It should be pointed out that instructional costs are usually computed on the basis of all students enrolled in the institution and not only on those using the facility or service.

E. The nine institutions with terminals spent an average of $17 per year per registered student for computer facilities for instruction. The six colleges with their own small computers averaged $28 per year per registered student for instructional and research uses. The five institutions sharing a computer spent approximately $18 per year per registered student for instruction and research.

Scope | 2

Methods of Access to Computer Facilities:

To obtain at least partial answers to the questions stated in the previous chapter and other related questions, the National Science Foundation made grants to 20 colleges in the SREB region for experimentation in ways of supplying computer facilities to the small institution for instructional uses. Three different ways for the small college to obtain access to computer facilities were involved in the experiment. These methods were:

A. Remote Terminals From Computers at a University or Commercial Time-Sharing Center—Colleges with less than 1,000 students may find that this is the best approach. Where communications costs are separate they are proportional to distance and the colleges must give careful consideration to these costs when selecting a supplier of time-sharing services. The nine colleges which used terminals are listed on Table 2.1 along with their suppliers.

B. The Use of an Independent Small Computer in Each College—Unless there are distinct differences in costs, many colleges will prefer to have their own small computer. Some of the small computers now have mass storage capabilities, card input-output, and a line printer. These features open up possibilities for administrative use as well as instruction and research. The six colleges which participated in the SREB/NSF Regional Computer Experiment with this method are identified in Table 2.2.

C. Cooperative Use of Small Computer with Other Colleges (by means other than over communication lines) —Where several small institutions are clustered or are at least in the same metropolitan area, a small computer which offers more flexibility than a typewriter terminal might be shared in a central location. Five institutions of the Atlanta University Center Corporation shared such a facility for instructional and research uses (see Table 2.3).

Description of Participating Institutions:

Thirteen of the institutions received grants for a two-year period at the beginning of the experiment, just prior to the start of the 1968-69 academic year. The remaining seven (Huntingdon, Millsaps, Mississippi Valley State, Murray State, Huston-Tillotson, Queens, and Transylvania) received their grants just prior to the 1969-70 academic year, also for a two-year period.

The original thirteen institutions, with one exception,[1] participated during the 1970-71 year (their third year) by submitting data and attending two meetings of the Principal Investigators (discussed in Chapter 3) without additional financial support of their facilities by NSF. However, funds were made available to cover their expenses to the two meetings by NSF through SREB.

Figure 2.1 is a map of the SREB states indicating the location of each participating institution and the method of access to computing facilities.

Fall enrollments for 1970, highest level of offering, public or private control of the institutions, predominant sex of the student body, and type of term are given in Figure 2.2. Of the 20 institutions, eight have predominantly Black student bodies and 12 are located in major metropolitan areas (Atlanta, Austin, Baltimore, Charlotte, Jackson, Montgomery, Nashville, New Orleans). Two others are in a rural setting whereas the remaining six are located in small to medium size cities.

[1] Maryville College received a grant from NSF to participate in "An Experiment on Utilizing Mini and Very Small Computers for Instructional Uses" during the summer of 1970. In this latter project they acquired an HP2114B. This project is also administered by SREB, through NSF Grants 1072,1111. All future references to Maryville College will pertain to their activities prior to June 1, 1970, unless otherwise stated.

Table 2.1

Colleges With Terminals

COLLEGE	PRINCIPAL INVESTIGATOR	TERMINAL & SUPPLIER
Loyola College	Dr. Bernard J. Weigman, Jr. Chairman, Physics-Engineering Department 4501 North Charles Street Baltimore, Maryland 21210	ASR-33 Teletype Leasco-Response (H-P 2116B) (C-A-C, 1968-70)
Maryville College	Dr. Norman D. Love Assistant Professor of Physics Maryville College Maryville, Tennessee 37801	ASR-33 Teletype Call-A-Computer (GE 265) (1968-70)
Wofford College	Dr. Dan Olds, Chairman Physics Department Wofford College Spartanburg, South Carolina 29301	ASR-33 Teletype H-P 7200 A Plotter Call-A-Computer (GE 265)
Huntingdon College	Dr. Rex C. Jones, Head Department of Mathematics Huntingdon College 1500 E. Fairview Avenue Montgomery, Alabama 36106	ASR-35 Teletype United Computing Systems (GE 265)
Millsaps College	Mr. Guy T. Solie Assistant Professor of Economics and Business Administration Department of Economics Millsaps College Jackson, Mississippi 39210	ASR-33 Teletype United Computing Systems (GE 265)
Mississippi Valley State College	Dr. Sherif A. Kahn Mississippi Valley State College Itta Bena, Mississippi 38941	IBM 1050 with card reader Mississippi Research and Development Center (IBM 360/40)
Murray State College	Mr. Wayne Day Director of Federal Programs Murray State College Tishomingo, Oklahoma 73406	IBM 2741 Oklahoma State University (IBM 360/65)
Huston-Tillotson College	Dr. James H. Means, Jr., Head Department of Mathematics and Physics Huston-Tillotson College Austin, Texas 78702	ASR-33 Teletype University of Texas (CDC 6600)
Queens College	Dr. Frank DeFelice Associate Professor of Economics Queens College Charlotte, North Carolina 28207	ASR-33 Teletype and IBM 1050 Triangle Universities Computing Center (IBM 360/75)

Table 2.2

Colleges With Small Computer On-Campus

COLLEGE	PRINCIPAL INVESTIGATOR	COMPUTER FACILITY
George Peabody College	Dr. James H. Hogge Assistant Professor of Psychology George Peabody College for Teachers Nashville, Tennessee 37801	IBM 1130, 8K 2310 Disk 340 1/m Printer
Xavier University	Sister Patricia Marshall Director, Computer Center Xavier University of Louisiana New Orleans, Louisiana 70125	IBM 1130, 8K
Centenary College	Dr. Rufus F. Walker, Jr. Department of Physics and Engineering Science Centenary College of Louisiana Shreveport, Louisiana 71104	IBM 1130, 8K Calcomp 565 12" Plotter Nuclear Data Pulse Height Analyzer
Eastern Mennonite College	Mr. Mahlon N. Rissler Computer Center Director Eastern Mennonite College Harrisonburg, Virginia 22801	IBM 1130, 8K
Fairmont State College	Dr. B. G. Dunn Professor of Business and Economics Fairmont State College Locust Avenue Fairmont, West Virginia 26554	IBM 1130, 8K
Transylvania College	Dr. James E. Miller Assistant Professor of Mathematics & Physics Department of Mathematics Transylvania College Lexington, Kentucky 20508	IBM 1130, 8K

Table 2.3

Cluster Of Colleges Sharing A Small Computer

Atlanta University Clark College Morehouse College Morris Brown College Spelman College	Mr. Grover Simmons Director, Computer Center Atlanta University Center Corporation Atlanta, Georgia 30314	IBM 1130 16K, 2310 Disk 340 1/m Printer 1627 Plotter IBM 1232 Optical Reader

Figure 2.1

Geographic Distribution of Participating Institutions

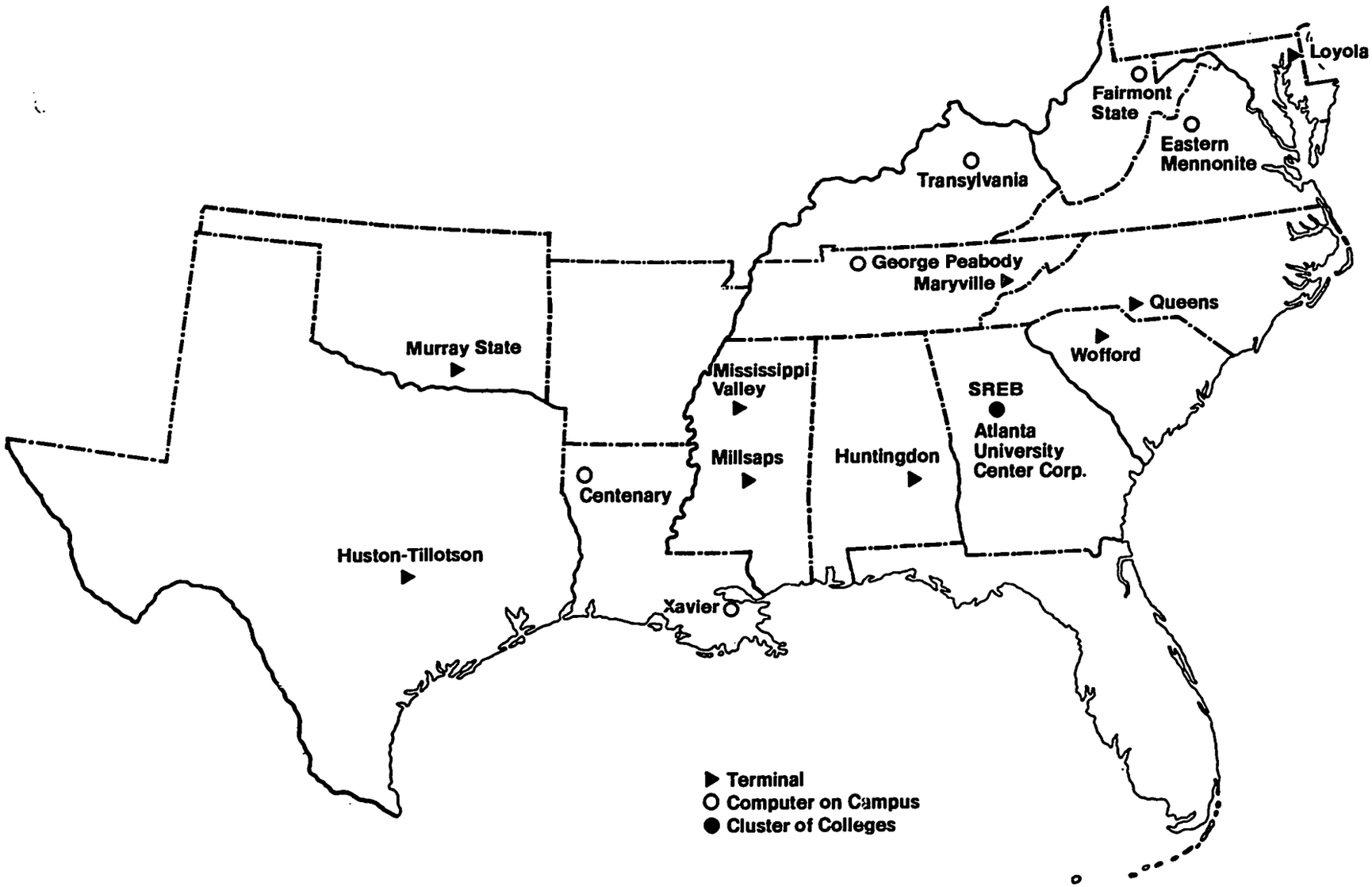
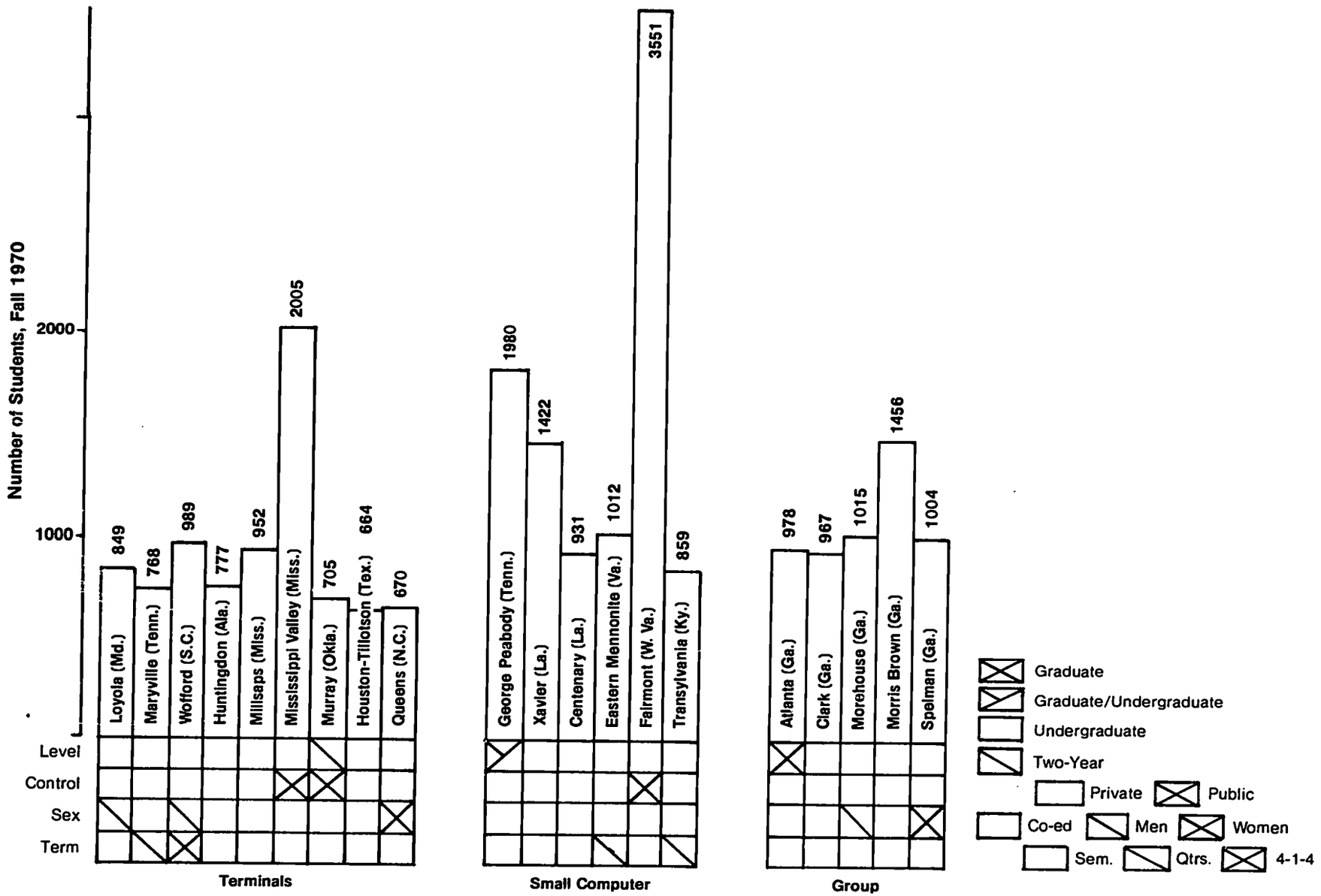


Figure 2.2

Characteristics of the Participating Institutions



Specific Activities of the SREB Staff | 3

During the period of the grant, the staff of the Computer Sciences Project of SREB engaged in a variety of activities in addition to those related directly to the collection of data for the NSF report.

Each activity is described below in a short but usually complete statement. Some, however, require more detail than is fitting for this chapter. In such cases, a reference is made to other sections of the report for an expanded discussion of those activities.

Case Studies:

A case study was developed for each institution in the project. Each study includes descriptive information about the college, its students, and its curricula. A chronological narrative presents the computing experiences of each institution from a point prior to and through the experiment to a point after the cessation of the NSF funds. The individual case studies are in Chapter 7.

Attitude Questionnaire:

The questionnaire which was designed by the project staff to measure attitudes toward computers in general was administered to students, faculty, and administrators in a pre- and post-experiment fashion. A description of this endeavor and the results are summarized in Chapter 8.

Bibliography:

A bibliography was prepared and disseminated to provide educators with information on texts and reference materials available for introductory courses in computer education. Texts were reviewed by faculty in the colleges and annotations added by the reviewers.

Prototype Users' Manual:

A prototype users' manual for a small college computer center was prepared and disseminated. It was intended to serve as an example for colleges operating a small computer installation. The content was not necessarily recommended as appropriate to all schools but was to be considered as typical of the kind of material which should be included in a college computer center users' manual. With this as a starter local adaptions could readily be made.

Time-Sharing Fact Sheet:

A fact sheet listing time-sharing services available in the SREB Region was prepared and disseminated. Twenty-three (23) different suppliers were identified. The intent was not to provide complete information but to give a general view of what was available, where, and what it cost.

Problem Set:

A collection of 135 problems categorized as being most useful in teaching programming and computer science, mathematics and physics, business and economics, and statistics was prepared and disseminated. Each problem was given a source identification and level of difficulty rating (i.e., with respect to programming).

Common Library for Call-A-Computer Time-Sharing Users:

In order to provide a vehicle for exchange of programs among the schools using Call-A-Computer time-sharing services, arrangements were made for a common library of programs. The user numbers for these schools were in the same "equivalency class." Thus, any program name with an asterisk (*) in the sixth position could be accessed by the other schools. An information file was established to allow the schools to learn what had been added recently to the common library. This was abandoned after about six months from lack of use and changes in CAC service locations.

Fortran Short Course:

A need soon arose on most of the campuses for materials which could be used to assist potential users in acquiring programming skills. In an attempt to provide a prototype mini-course in a programming language for self study or as an adjunct to an 8-10 hour short course with an instructor, the publication Prototype FORTRAN Mini-Course for a College Computer Center was produced and disseminated.

The first drafts were prepared from the recording of a short course taught to faculty at the Atlanta University Center Corporation Computing Center, with revisions based on the experiences of the project staff. The final form was FORTRAN for an IBM 1130 with a 1403 printer. Only minor changes are required for other configurations of the IBM 1130 or FORTRAN for other computers. If another language is desired more modifications will be required.

Machine Independent Measures of Computing Needs for Students in Higher Education—A Pilot Study:

In an effort to create an instrument for determining independent measures relative to courses utilizing the computer, a pilot study was conducted. A description of this special study and the results are given in the complete report submitted to the NSF.

Curriculum Development Grants and Workshops:

During the summer of 1959 the NSF funded some computer involved curriculum development activities in five academic disciplines on four of the campuses. In general they involved the development of curricular materials incorporating the computer and the dissemination of the results to the other institutions via a series of two workshops. A more complete description of these activities is given in Chapter 5.

Visitations:

Project Director: The initial visit to the campuses after the grants were awarded was made by the project director. These visits were approximately one-half day at the colleges with terminals and a full day at the colleges with a small computer. The principal objectives of this first visit were as follows:

- through conferences with the President, Vice President, Dean, Principal Investigator and faculty groups to create and/or assess the awareness of the college's participation and interest at the top administrative levels.
- to review the commitments of the colleges, particularly with regard to reporting requirements and the administration of the attitude questionnaire.
- to provide consultation on installation problems such as space requirements, physical arrangements, traffic flow, and late-hour accessibility of equipment, accessories, and supplies.
- to suggest applications of the computer to instruction and research in all areas of interest.

Associate Project Director: The associate project director's first visits to the institutions laid the groundwork for collection of the case study data and administration of the attitude questionnaire. These arrangements were usually made with the Dean or Academic Vice President.

He also participated in an all-campus seminar, a television program, and in discussions of curriculum development, computer operation, and campus-wide utilization of the computer facilities.

Assistant Project Director:[1] The assistant project director's activities during his visits to the institutions centered around discussions of and leads to curricular materials, pedagogical and research applications, and ways of encouraging broader usage of facilities. He taught a FORTRAN short course for faculty at the Atlanta University Center as a starting point to the development of the 8-10 hour short course referred to previously.

Other Activities:

During the period of the grant the principal investigators from the campuses met ten times. Early meetings were largely devoted to discussing the installation and management of the computer facility. Later meetings dealt primarily with curriculum and curriculum materials development and project evaluating and reporting.

An observer at an early meeting was reminded of the meetings of the university computer center directors which were held in the Midwest and the Southwest in the mid-1950's. The important difference is that we now have nearly fifteen year's experience in university centers to draw upon and much better hardware and software than we did then. Consequently, we are able to bring the college computer operations through the "starting-up" pains, which lasted for several years in the 1955-60 period, in a few months.

[1] E. M. Chandler, 1968-70.

Computing Facilities | 4

Software:

Table 4.1 summarizes the various languages used by or available to the students and in which mode or modes. It also lists the operating systems and other miscellaneous items available.

Hardware:

Table 4.2 lists the hardware facilities on each campus and, in the cases of terminal facilities, the off-campus computer resources.

Services:

Table 4.3 presents services provided users of the computer facility. Services include mode of use, availability, charges, and other aids.

Table 4.1

Languages Used: Status As of June 1, 1971*

Institution	Assembler	BASIC	FORTRAN	ALGOL	COBOL	PL/I	RPG	APL	Operating System	MISC.
Loyola		I	I						Response I	
Maryville		I	I	I					GECOS	
Wofford		I	I	I					GECOS	EDIT,LISP
Huntingdon		I	I	I					GECOS	EDIT
Millsaps		I	I						GECOS	
Mississippi Valley	B		RB,B		B	RB,B	B		OS-360	
Murray State						I			OS-360	
Huston-Tillotson	I,RJE	I,RJE	I,RJE	I,RJE	I,RJE				TAURUS	
Queens		I,RB	RB			I,RB	RB	RB	OS-360	
Peabody	B		B				B	IB	1130 Disk Monitor	
Xavier	B		B		B		B	I	1130 Disk Monitor	
Centenary	B		B				B	I	1130 Disk Monitor	
Eastern Mennonite	B		B				B		1130 Disk Monitor	
Fairmont State	B		B	RJE	B RJE	RJE	B	I	1130 Disk Monitor	ECAP
Transylvania	B		B				B		1130 Disk Monitor	GO TRAN
Atlanta Univ. Center Corp.	B		B					I	1130 Disk Monitor	SLI

*With the exception of Maryville in which case it is the status as of June 1, 1970.
B — Batch I — Interactive RB — Remote Batch RJE — Remote Job Entry

Table 4.2

Facilities: Status As of June 1, 1971*

Institution	1970-71 % R&I Use**	On-Campus Hardware Unit	Mode of Use	Off-Campus Hardware Unit	Institution/Company Location of Computer	Comments
Loyola	100	ASR-33(4)	Local Telephone	H-P 2116B	Leasco-Response Bethesda, MD	3 units on-line; 1 unit for off-line tape preparation. IBM 1130 and Univac 1108 also available at companies.
Maryville	100	ASR-33(2)	In-Watts	GE-265	Call-A-Computer, Inc. Los Angeles, CA.	1 unit on-line; 1 unit for off-line tape preparation.
Wofford	100	ASR-33(2) HP-7200A Plotter	In-Watts	GE-265	Call-A-Computer, Inc. Raleigh, NC	1 unit on-line; 1 unit for off-line tape preparation.
Huntingdon	100	ASR-35	In-Watts	GE-265	United Computing Systems, Kansas City, MO.	
Millsaps	100	ASR-33(2)	In-Watts	GE-265	United Computing Systems, Kansas City, MO.	2 units on-line. IBM 1130 at Jackson State used for some courses.
Miss. Valley State	100	IBM 1050	In-Watts	IBM 360/40	Miss. Research & Dev. Center, Jackson	IBM 360/20 on-campus for administrative use mainly.
Murray State	100	IBM 2741	Long Distance	IBM 360/65	Oklahoma State Univ. Stillwater, OK.	
Huston-Tillotson	100	ASR-33(2)	Local Telephone	CDC-6600	University of Texas, Austin, TX.	
Queens	95	ASR-33 IBM 1050	In-Watts	IBM 360/75	Triangle Univ. Com. Cen. Research Triangle Pk., NC	Call-A-Computer in Raleigh, NC also used.

		On-Campus Hardware						
			Core Storage	Disk Storage	Card Read	Speed Punch	Line Printer Speed	Comments
Peabody	88	IBM 1130	8K	1536K	300	60	340 1/m	XDS Sigma 7 and IBM 7072 at Vanderbilt also available.
Xavier	52	IBM 1130	8K	512K	300	60	80 1/m	
Centenary	75	IBM 1130	8K	512K	400	60	80 1/m	Calcomp 565 12" Plotter. Nuclear Data 2200 multichannel pulse height analyzer
Eastern Mennonite	34	IBM 1130	8K	512K	300	60	80 1/m	
Fairmont State	42	IBM 1130	8K	512K	400	60	80 1/m	ASR-33 to W. Va. Univ. on campus.
Transylvania	60	IBM 1130	8K	512K	300	60	80 1/m	Also available is IBM 360/65 Univ. of Kentucky.
Atlanta Univ. Center Corp.	100	IBM 1130	16K	1536K	300	60	340 1/m	1232 Optical Page Reader; 1627 Calcomp Plotter. IBM 1401 for administrative use only. ASR-33 to Emory Univ. for School of Business.

*With the exception of Maryville College in which case it is the status as of June 1, 1970
**R&I — Research and Instruction

Table 4.3

Type of Services: Status As of June 1, 1971*

Institution	Unit	Mode I	RJE	RB	B	Approximate Availability	Charges	Service Aids
Loyola	ASR-33	X				8:30 pm-6:00 pm M-F(1)	$400/mo./line + Storage	Language manuals from Leasco. Computer magazines in special reading room.
Maryville	ASR-33	X				8:00 am-5:00 pm M-F 9:00 am-12:00 am Sat. 2:00 pm-5:00 pm Sun.	$890/mo. + Storage	Non-credit seminars & C-A-C Manuals. Newsletter
Wofford	ASR-33	X				8:00 am-6:00 pm M-F 9:00 am-12:00 am Sat.(1)	$890/mo. + Storage	Users' manual, C-A-C manuals, newsletter, one-credit intro. course and interim project in computer use.
Huntingdon	ASR-35	X				7:00 am-11:00 pm M-F	$100/mo.+Storage	Users' manual and student assistants
Millsaps	ASR-33	X				2:00 am-11:00 pm M-Sat.	$100/mo.+Storage	United Computing manual & one-hr. non-credit short course twice each semester
Miss. Valley State	IBM 1050			X		10:00 am-4:00 pm M-F	$100-150/hr + $1939/12mo. Com.**	IBM manuals, computer logic device, audio tapes, and film
Murray State	IBM 2741					8:00 am-5:00 pm M-F	$100/hr. CPU	Users' manual & conferences with O.S.U. Computer Center personnel
Huston-Tillotson	ASR-33	X	X			9:30 am-4:00 pm M-Sat. 5:30 pm-10:00 pm M-F	$200/hr. TM	Language & users' manuals from U of Texas and CDC.
Queens	ASR-33 IBM 1050	X		X		9:00 am-9:00 pm M-F	$345/hr. CPU + $3/hr. connect	Lecture and discussion with all math classes & with all Freshmen English students. Separation & distribution of "Iowa Conference" reports.
Peabody	IBM 1130	X			X	8:00 am-10:00 am M-F Reservation Per.; 10:00 am-3:00 pm M-F Open Shop		Users' manual for center & Peabody Statistical Lib. & tours for high school & college classes.
Xavier	IBM 1130	X			X	Staff-21 hrs/wk; Batch-19 hrs/wk; Open Shop-15 hrs/wk. Classes-9 hrs/wk; Admin.-3 hrs/wk (1)		IBM manuals, user memos, films, and lecture-demonstrations for special groups.
Centenary	IBM 1130	X			X	Open Shop-30 hrs/wk; Admin. 10 hrs/wk; Batch-8 hrs/wk; Reservations- 5 hrs/wk.		Short course (non-credit, 6 meetings) each term, manufacturers' manuals, programming club, & staff consultation
Eastern Mennonite	IBM 1130				X	8:00 am-1:00 pm, 5:00-6:00pm M-F Closed Shop; 1:00 pm-5:00 pm M-F, 6:00 pm-10:00 pm M-Thu Open Shop		IBM & Users' manuals
Fairmont	IBM 1130 ASR-33	X X	 X		X	Admin.-25 hrs./wk.; Quick Turn Around- 15 hrs./wk.; Batch-12 hrs./wk.; Classes 3 hrs./wk.		IBM manuals & staff consultation
Transylvania	IBM 1130				X	8:00 am-1:00 pm M-F Closed Shop; 1:00 pm-5:00 pm M-F Open Shop (1)		IBM manuals and short courses in GO TRAN.
Atlanta Univ. Center Corp.	IBM 1130	X			X	8:00 am-11:00 pm M-F Closed Shop; 10:00 am-1:00 pm Sa Closed Shop		Two programming short courses for faculty and statistical consultant available weekdays

I — Interactive RJE — Remote Job Entry RB — Remote Batch B — Batch (1) Other times by special arrangements
*As of June 1, 1970 for Maryville
**Communication Cost

Curriculum Development | 5

Special Curriculum Development Grants:

Faculty at four of the colleges received one-year curriculum development grants from the National Science Foundation to work in the areas of chemistry, economics, mathematics (numerical methods), natural sciences, and physics. In conjunction with these grants SREB was awarded travel funds to bring approximately two faculty from each of the twenty colleges to two workshops. The first one was a "Demonstration and Tutorial" workshop conducted at the University of Tennessee, Knoxville, using the IBM 1130 computer facilities of Knoxville College. The second workshop, a "Review and Critique", was held four months later at Daytona Beach, Florida, using the IBM 1130 computer facilities of Daytona Beach Junior College. Insofar as possible the same faculty attended both workshops.

The principal investigators for the curriculum development grants were as follows:

Chemistry:

Dr. Joyce H. Corrington
Department of Chemistry
Xavier University of Louisiana
New Orleans, Louisiana 70125

Economics:

Dr. Tridib K. Mukherjee
Department of Economics
Fairmont State College
Fairmont, West Virginia 26554

Mr. William Laughlin, Jr.
Department of Economics
Fairmont State College
Fairmont, West Virginia 26554

Numerical Analysis:

Dr. James F. Key
Department of Mathematics
George Peabody College for Teachers
Nashville, Tennessee 37203

Natural Science:

Mr. Harold Crowell
Assistant Professor of Physics
George Peabody College for Teachers
Nashville, Tennessee 37203

Physics:

Dr. Bernard J. Weigman, Jr.
Department of Physics
Loyola College
4501 North Charles Street
Baltimore, Maryland 21210

Dr. James Rozics
Department of Physics
Loyola College
4501 North Charles Street
Baltimore, Maryland 21210

The following papers, presentations, and other participations in the "Conference on Computers in the Undergraduate Curricula" at the University of Iowa, June 16-18, 1970, were a direct result of these activities:

Session Chairmen:

Dr. Joyce H. Corrington
Dr. Elizabeth D. Swiger
Dr. Bernard J. Weigman

Papers presented: (Included in Proceedings)

Corrington, Joyce H. and Sister Patricia Marshall; "Computer Programs for Use in the Undergraduate Chemistry Curriculum." (Xavier)

Love, Norman D.; "The Introduction of the Computer into Maryville's Freshman Science Course."

Swiger, Elizabeth D.; "A Staged Plan for Integrating Computer Instruction into the Chemistry Curriculum at Fairmont State College."

Walker, Rufus F.; "Use of ECAP in Undergraduate Electronics Instruction." (Centenary)

The following materials were produced through these grants:

Key, James F.; *A Computer-Oriented Activities Manual for Principles of Numerical Methods;* George Peabody College for Teachers, Nashville, Tennessee 37203, 335pp.

Key, James F.; *Programmed Solutions to Selected Exercises in Numerical Methods:* A FORTRAN IV Instructor's manual for the IBM 1130 Computer; George Peabody College for Teachers, Nashville, Tennessee 37203.

Weigman, Bernard J. and James D. Rozics; "Collection of Physics Problems and Laboratory Experiments"; Loyola College, Baltimore, Maryland 21210, 204pp.

Corrington, Joyce H. and Louis C. Cusacks; "Computer Programs to Supplement Undergraduate Chemistry Curriculum"; Xavier University of Louisiana, New Orleans 70125.

Inquiries as to availability of copies of the above materials should be directed to the authors.

Courses Using The Computing Facilities:

Courses using the computing facilities during the 1970-71 academic year are listed below. The number in parentheses after each course indicates the number of courses involved which were similar at least in title.

Programming [1]

Introduction to Computer Programming (12)
Computer Programming (4)
Computer Concepts (1)
Computer Use (1)
Computer Programming and Numerical Analysis (1)
Assembly Language (1)
Business Analysis and Machine Accounting (1)
Orientation (1)
Programming Languages and Techniques (1)

Computer Science [2]

Computer Systems (1)
Mathematical Problems (1)
Introduction to Computing (1)
Computers and Programming (1)
Discrete Structures (1)
Numerical Methods (1)
Data Structure (1)
Programming Languages (1)
Numerical Analysis (1)
Systems Analysis in Library and Information Science (1)
Data Processing of Library Operations (1)
Documentation and Information Storage and Retrieval (1)

Mathematical and Physical Science

Physical Chemistry (10)
General Chemistry (8)
Introduction to Chemistry (1)
Chemical Principles (1)
Instrumental Analysis (5)
Analytical Chemistry (2)
Advanced Inorganic Chemistry (1)
Quantitative Analytical Chemistry (1)
Thermodynamics (1)
Honors Program (1)
Undergraduate Research (1)
Numerical Analysis (10)
Analytic Geometry and Calculus (4)
Elementary Statistics (4)
Probability (3)
Fundamentals of Mathematics (3)
Introduction to Finite Mathematics (1)
Pre-Calculus Mathematics (1)
Advanced Calculus (2)
Linear Algebra (3)
Modern Algebra (2)
Intermediate Algebra (1)
Differential Equations (2)
Theory of Equations (1)
Plane Trigonometry (1)
Independent Study in Mathematics (1)
General Physics (10)
Electricity and Magnetism (5)
Atomic and Nuclear Physics (3)
Electronics (2)
Mathematical Physics (2)
Physics I (3)
Physics II (2)
Matter and Energy (2)
Modern Physics (1)
Intermediate Physics (2)
Intermediate Mechanics (1)
Advanced Mechanics (1)
Electromagnetic Waves (1)
Physics Laboratory (2)
Quantum Mechanics (2)
Mechanics and Heat (2)
Heat and Thermodynamics (1)
Introduction to Dynamics, Properties of Matter, Vibrations and Waves (1)
Introduction to Computer Applications (1)
Computers in the Arts and Sciences (1)
Seminar (1)
Interim (1)
Introduction to Physical Science (1)
Science Thought (1)
Science Fundamentals (1)

Biological Science

Genetics (1)
Introduction to Plant Physiology (1)
Independent Research (2)

1 Courses concerned primarily with e programming language regardless of where they are "housed" ecademicelly.
2 Courses dealing with systems programming, information structures, computer organization, etc. regardless of where "housed."

Social Science and Education

Psychological Statistics (8)
Measurement (2)
Factor Analysis (1)
Group Dynamics (1)
Experimental Psychology (1)
Physiological Psychology (1)
Computer Applications in the Behavioral Sciences (1)
Research Seminar (1)
Microeconomics (2)
Macroeconomics (4)
Principles of Economics (1)
Business Finance (1)
Economic Analysis (1)
Economic Statistics (1)
Educational Media (1)
Automated Data Processing in Education (1)
Research and Measurement (1)
Methods of Educational Research (1)
Thesis Dissertation Problems (1)
Sociology (1)
The American Community (1)
Technology and Social Change (1)
American Politics (1)
American Legislature (1)
Seminar (1)

Business

Principles of Accounting (3)
Marketing (3)
Investments (1)
Business Policy and Problems (1)
Introduction to Data Processing (1)
Managerial Finance (1)
Principles of Business (1)
Economic Research (1)
Intermediate Macroeconomic Theory (1)

Arts and Humanities

Communication (2)
Seminar (1)
Contemporary Composition (1)

Engineering, Forestry, and Agriculture

Electronics (2)
Industrial and Microwave Technology (1)
Vectors, Tensors and Statics (1)
Introduction to Mechanics (1)
Foundations of Electrical Engineering (1)
Engineering Laboratories (4)
Systems Analysis (1)
Theory of Signals, Systems, and Noise (1)

Comments from the Institutions | 6

A few statements extracted from the individual reports of the colleges serve as testimonials to the recognition and high regard for the computer facilities on some campuses as well as gratitude and appreciation to the National Science Foundation for helping to make these facilities available. Additional comments of this nature can be found in the "Official College Statements" section of each case study in Chapter 7.

Loyola College:

One of the more interesting results of our one-year experiment so far is the computer-oriented attitude that seems to be coming into existence on our campus, at least among science-oriented students who have been using it. Students regularly use the computer for laboratory data analysis, homework, takehome tests and other routine assignments. They seem to have accepted the computer now in the same way as they did the slide rule and calculating machine two years ago. Many students learn simple programming themselves even before they sign up for any formal courses. Our next major goal in this coming year is to interest as many non-science students in the computer as we can. (1968-69)

The computer program has had a tremendous effect on the Physics and Engineering curricula at Loyola College. It has had a somewhat lesser effect on the programs of Accounting, Economics, Business Administration, Mathematics, Chemistry, and Philosophy. Nevertheless it has had some effect and this in itself is encouraging. It has had little or no effect on the other departments, but the word is getting around that the computer is here to stay on our campus and I think that before long the Departments of Sociology, Psychology, Education, Biology, and even English will begin to make use of the facility.

The computer has made such a mark on the departments that are using it regularly that one is hardput to remember what it was like without it. Students are using it instead of the calculator and find it hard to believe that students here just three years ago could do anything significant without a computer. All laboratory results are routinely analyzed with the computer. Last week the administration authorized money for the Economics Department to rent two terminals to be housed in their building. Even with the expiration of NSF money this year, the college has authorized $10,500 for next year's computer budget, a sum which would have been unthinkable three years ago.

We have talked to a large number of companies selling computer time in the past year. Competition among these companies is keen, and we are in a knowledgeable position to get the best rates available. We have gained a lot of experience in the last two years. This summer, Dr. Rozics and Dr. Weigman will be paid by Loyola College to study the new FORTRAN system recently developed by LEASCO. If used, this system could save Loyola $15,000 to $20,000 the next year alone.

Our students feel that the knowledge of computer programming has made them more valuable to companies when they graduate. This is the message that we are taking to the local industries and they agree with us. Timesharing, which was a new toy when we started in this program, is a well-accepted means of computation today. (1969-70)

Perhaps the most significant fact about the computer program on our campus is its tremendous growth. Five years ago we had no facilities at all on campus. Today we are at the point where we cannot afford timesharing. Our budget rose from $10,550 in FY1971 to $19,500 in FY1972. Last year we reported that Dr. Rozics was being paid by Loyola to investigate Leasco Fortran since it might save us money. If we had bought two unlimited CAC contracts for $890 per month for 10 months and paid about $150 per month storage charges for 9 months the total cost would have been $19,150. Comparing this to the actual cost of $9,270, we came out ahead. Plus we had better service since there were times when we had 3 and even 4 terminals on-line at the same time.

Next year we are considering purchasing our own mini-computer in the $60K to $100K price range. The alternative to this seems to be a strict pay-as-you-go basis. The cost of Leasco time is $5.75/hour prime and $3.00/hour non-prime to educational institutions. Two prime hours to each non-prime hour averages to $4.80 per hour. Based on last years figures of 2016 hours, this would be about $9,700. An anticipated growth of 50% (Loyola is increasing from 800 students to 1,150 due to a merger with a woman's college) would raise the cost to $14,500 which would strain our budget of $19,500 because communication costs and teletype rentals must still be deducted.

The growth in the Evening College is also heartening. The first time we offered Eg110 (Computer Programming) in the evening we set a limit of 25 students. The course filled. The money this brings in (about $129 per student) helps defray expenses of the computer. (1970-71)

Maryville College:

One of our goals was to develop a course which would be required of all our students. This course would give students the knowledge of what a computer is by actually teaching them how to use the computer. We did develop a two week short course and incorporated it into an existing science course required of all students. The two week course consists of four one hour lectures and a set of simple problems to be solved on the computer making use of the BASIC language. About 1/3 of the students in this course have a working knowledge of programming. (1969-70)

Wofford College:

Prior to the July 1968 receipt of funds to participate in this regional experiment, Wofford had very little experience with computers. An active unit record system had already been put into effect by the Controller's Office, however. A time-sharing terminal had been installed in the Physics Department on April 15, 1968, but the usage was greatly restricted by financial limitations.

The funds obtained through participation in this regional experiment are being used to support this single Model ASR 33 teletype and to purchase time-sharing service from Call-A-Computer (Raleigh, N.C. and Atlanta, Ga.). It is now possible to make use of this system in a much wider range of courses and other educational applications. This expansion is already affecting courses in several departments. (1968-69)

Millsaps College:

Students who completed the computer 300 course were eager to use programming in other courses. Student assistants were very helpful in programming models used in some courses. Biology usage was apparently by faculty only.

The non-credit, short course (X150) in BASIC offered two periods during the spring semester, taught by a senior, interested some students in computers and programming without their risking grade point credits.

An evaluation of usage reports during the year revealed that Geology used the computer in the fall but not during the spring semester and apparently not for student use, because no report was received. In both Physics and Chemistry usage was very high the first two months but tapered off drastically in Chemistry by the end of the year. The close proximity of the terminal to these two departments and the novelty of the facility when first installed may account for this pattern of usage.

There was considerable and consistent use in the computer course. Mathematics appeared to make consistent use during the entire year. Economics made considerable and sustained use during the spring semester.

Some of the computer costs associated with the Computer 300 course are not reflected in the figures presented here because student projects for the course in FORTRAN IV had to be run on the 1130 at Jackson State College where the instructor for that course is Chairman of the Department of Mathematics and Computer Center Director. This time was provided without charge. (1969-70)

Mississippi Valley State College:

A few short years ago there was very little awareness of the computer era among the general student body on this college campus. With no facilities available, students could not become computer-oriented nor think of computers for problem solving. After the installation of the IBM/360 Model 20 on this campus in 1968, many students assumed the computer was limited to process-data for the Business Office and payroll sections of the institution.

Soon after the initiation of the NSF computer project, student attitudes began to change. The students in the Department of Science and Mathematics who were not actually registered in a course in programming began talking in terms of using the computer in their daily routines. During the second year of the NSF experiment, these students started using the computer for their daily routines, and the personnel who administered the project were as busy with non-programming students as with those actually registered in programming. Student users were from Biological Sciences, Business, and Industrial Technology. The administrators were already highly appreciative of the use of the computers and hoped this use could continue and increase even after the termination of the NSF grant. Discussions with various academic personnel confirmed the need for better computer facilities. The distribution of the proceedings of the Iowa Conference on Computers among the college faculty played a significant role in this respect. The impact of the NSF project has been so significant that a majority of the college community is in favor of getting a midi-computer and using

it for both administrative and academic purposes. Classroom teaching combined with practical application should better prepare students for the uses of computers outside the academic environment.

As Mississippi Valley is a state supported institution, any significant changes concerning monetary matters must first be approved by the Board of Trustees. The State of Mississippi has already appropriated a sum of $400,000 for the construction of a building, part of which will house the central computing facility.

An increasing percentage of students now use the computer facility in their area of training, especially students in Business, and Biological and Physical Sciences. The interest of the faculty members in areas involving complicated problem-solving is also increasing, but the 1050 Terminal has only a subset of FORTRAN and PL/1, and CPU time is limited. Thus long and complicated problems cannot be solved. We hope the installation of a midi-computer would improve this to some extent. (1970-71)

Houston-Tillotson College:

Our computer program got off to a late start during the first semester. The teletype machines were not readily available. The teacher from Houston-Tillotson College who is to handle the computer project was given a year's leave to study computer programming. A graduate student from the University of Texas was given the job of teaching the course which was offered. Also, a graduate student from the University acted as a laboratory assistant in the computer laboratory. In all respects the computer personnel at the University helped in our program. Some of our faculty participated in several computer workshops. A COMPUTER ASSISTED INSTRUCTION program was designed and put on tape for future use here at the college. Several of the science faculty members have agreed to participate next year in the program. All at the college are very appreciative of the opportunity to participate in such a program that can mean so much to our college and to our students and graduates. (1969-70)

The new teacher of the programming courses, Mr. General Marshall, spent much effort and time with the students and the course. Consequently, the students who completed both sections of this course were able to understand the principles of programming and are able to apply it to other disciplines. Mr. Marshall kept in close touch with the personnel of the University of Texas Computation Center. (1970-71)

Queens College:

The computer seems primarily to get students interested in it and secondarily interested in the field in which it is being applied. It tends to motivate students but seldom has it encouraged interest in problems that would otherwise not have been contemplated. (Note: We did not do any simulation work, and this could have modified our findings.) In numerical analysis and programming the computer evidently allowed the doing of problems that time-restrictions would not have otherwise allowed. In one instance, an application to stylimetric analysis of literature, it did encourage some research that would not have otherwise been considered. A faculty member carried out an extended study of a putative work of St. Augustine.

We found that "blitz" introductions to programming (one-two clock hours) in PL/1 worked very well indeed. However, they do require careful preparation and good brief hand-outs (ours was one page) and must depend on simple examples and not precepts (especially when loaded with programming jargon). Terminals must be available for the student, with no more than four students per terminal. It is essential that the students be able to get on the terminals within a very short time after the first class hour, preferably immediately after the class has ended. Optimal class size is probably 6-8 students per available terminal. Somewhat of a fiasco occurred when we tried the "blitz" approach in a section with about 100 students (The Concepts of Communication Course). We had expected trouble and found enough of it to label the large-class approach as contraindicated. We did get about 85 percent of the students to run simple programs, but they were left with strong negative feelings about the whole operation: the confusion in the Computer Center, the waiting, the inexperienced computer center assistants (i.e., inexperienced in handling mobs). (1969-70)

The quantitative data on Form 400 understate usage and overstate costs per student by discipline, because the cost of the TTY hook up with Call-A-Computer is included in costs but could not be broken down by discipline. There were 161 runs made during the reporting period over the TTY with Call-A-Computer. Connect hours for these runs was 19.02. Because tapes and programs were prepared on the TTY, it was not available for much more than the connect time. Assuming that 5% of the usage is the connect time, then the console hours on the TTY would have to be increased by 20 X 19.02 or 380.4 hours. If these hours and runs could be distributed to the correct disciplines, costs per student would be significantly less.

The "infusion" requirement of the grant was carried out by presenting a one-hour lecture to all freshmen and all math courses in the fall semester. The lecture topics were Computers in General, Applications, and Programming Languages, and a simple program in PL 1 (Whinot) was distributed to all students. This was used as an example of a program and after it was explained line by line, the students were invited to come to the computer center and run it. Only a few did, but these lectures did create interest in computers as indicated by the fact that several students signed up for the Math 100 course shortly after the lectures plus the fact the Math 100 enrollment was up 25% over last year even though college enrollment fell. In the infusion lectures the students were given the Call-A-Computer phone number, Queens account code number, step-by-step instruction in how to call up the simulated slot machine game called BANDIT, and invited to come to the com-

puter center on their own to try their luck. Many did. Games do seem to stimulate interest. And the fact that they require hands-on experience immediately bridges one of the psychological gaps inhibiting computer usage.

Step-by-step procedures (1) for using Call-A-Computer library programs, (2) to address NCECS library programs in RJE, and (3) to address NCECS library programs in CPS were written and distributed to all Math 100 students and posted in the computer center along with a IBM 1050 Deck composition diagram using JET control. These were well received and quite helpful.

The use of the simulation in Econ 352 added an exciting, dynamic dimension to the course. However, simulations of this type generate punched card output and the lack of this capability on our 1050 setup was only overcome because of the small size of the class(2). A class of 30 making use of 8 runs of the simulation would require the punching of over 1,000 cards. The program was modified for the punched card output to come back printed; it then had to be punched for each successive run of the program. If only 2 or 3 such simulations were used with average size classes, there would be cost savings to upgrade by adding punched card output capability to the 1050. At the very least there should be "left zero" capability on the keypunch. (1970-71)

Xavier University of Louisiana:

Social Sciences are encouraging their new majors to take computer science or programming prior to research methods and statistics.

Some departments, including Social Sciences, are now seeking new faculty members who have had former computer exposure.

A "developing" Computer Science Department plans to implement either a minor in computer science or a concentration within other majors within four or five years.

Business Administration has developed a three-semester sequence in business data processing. Some exploration will be made into the feasibility of coordinating this curriculum with the one that develops in computer science. Some accounting courses are using the computer already.

Undergraduates are being involved in some research activities in the Chemistry Department.

Humanities faculty, while apparently not yet moving, do borrow and read publications from the computer center about computer-related activities in their fields. (1969-70)

Needing still further experience, we can only make a few observations.

Chemistry, heaviest academic user, has not convinced us that the canned-program approach is best. Textbook publishers are still dragging their heels; consequently, professors still feel insecure about launching out into the deep. There is great need for lab manuals and texts that call for or at least provide for problems that can be solved on the computer.

Our experiences show also that meaningful usage must (1) develop from within a department and (2) must somehow involve the entire faculty. The voluntary homework approach used in some math courses this year worked well, because (a) the faculty set an example and (b) the department established a climate that encouraged use of the computer wherever feasible.

Bolstering all efforts at Xavier is a new curriculum effective last September (1970). In addition to a three-hour computer science requirement for first-semester freshman majors in math, math education, physics, pre-engineering, and chemistry (and for pre-med sophomores), the University has designated computer science as one of the choices in one of the categories in the new core curriculum for all students. We are working toward a minor (or something fairly comparable) in computer science.

Another ray of hope: while little actual computer usage has occurred in some departments, interest is increasing more rapidly this year as evidenced by requests for information and assistance, invitations to address classes, etc. At least two additional departments are ready to go on the computer as soon as we can spare the manpower to give them the needed attention. And students, introduced to the computer by way of the new core curriculum choice, may well turn into that needed manpower. (1970-71)

Centenary College of Louisiana:

Progress has been made in extending computer usage among both faculty and students; while such progress is slow it is encouraging. The most notable success in expanding usage has been in the Department of Business and Economics. A considerable fraction of our programmer's time is currently devoted to preparing for expanded applications in that area.

No place has been provided for explicit mention of faculty development outside formal courses, so a few items will be mentioned here. Two faculty members (in the Math Department) not formally associated with the project have become quite interested—and quite expert—in using the computer. They have been particularly helpful in expanding usage both in formal courses and in assisting interested students with individual projects. In addition, two papers have been given by the co-directors of the computer installation; one was presented to the Louisiana Academy of Arts and Sciences while the other will be given at the Iowa Conference on Computers in the Undergraduate Curriculum. The principal investigator and computer staff have been cooperating in a research project with a member of the faculty of the Louisiana State University School of Medicine in Shreveport; for the summer of 1970, the principal investigator holds an appointment as Visiting Associate Professor of Biophysics at the institution, working in the area of computer applications. Further, one of the co-directors of the computer installation served this year as Program Chairman of the Shreveport Chapter of the Association of Computing Machinery and

the other has been elected Vice Chairman for next year.

There was no formal use by students in the Arts and Humanities but in practice we got a rather good press because one of the members of the faculty is doing a PhD thesis involving word frequencies in some of the works of Shakespeare. A member of the math department collaborated with him to automate this tedious process (word counting) with the result that a number of his classes were informed that the machine had done in a weekend what would have taken him at least six months.

The decision to acquire a plotter—mentioned previously in passing—deserves some comment. The presentation of information in graphic form seems particularly appealing to the inexperienced user; this appeal may be missed by the more experienced user who has conditioned himself to accept the limitations of line printer output. A 12" plotter can be purchased for the 1130 for less than $5,000 which is about 10 percent of one year's budget for an installation such as ours; this is a relatively small incremental cost for the large benefits resulting from the presence of a plotter. It is true that an on-line plotter is slow and that a plotter might create problems in a situation where most of the available time is already used; however, in our present situation we feel it to be a highly desirable addition and recommend that those in a similar situation seriously consider acquisition of a plotter if at all possible.

The budget is always a problem area (by definition, presumably) so a few words seem in order at the expiration of the NSF funding. During the grant period administrative data processing has been relegated to second priority in order to devote maximum attention to instructional usage. Next year—when the computer is supported entirely by the College—the data processing function will be expanded, though not at the expense of instructional usage since a staff member will be added to handle data processing. One policy change will be the running of administration work during prime shift; such work has previously been run at night (except for a day or two after registration) in order to keep prime time available to faculty and students. We believe that a small college computer must serve both administration and academic users if it is to give the most service per dollar expended and that with proper management it is possible to serve both harmoniously.

We believe our handling of administration work to be a "significant success" which has implications for the continuing stability of the installation. The key was careful selection and development of the very limited number of applications undertaken; our major data processing work is in the processing of current enrollment. It is crucial that data processing be done correctly; any campus will have some persons who are quick to downgrade a computer installation if they can find examples of errors attributable to automated processing. The system in use was developed during the summer of 1969 and has run very smoothly this year, thanks to the cooperation of the administration and the computer staff. As a result, plans for expanded data processing are based upon real needs and proven capabilities.

Contact with other installations, both through this project and through attendance at professional society meetings related to computing, has been most valuable. We share the belief—repeatedly expressed in the "First Report of An Exploratory Program of Regional Cooperative Computing Activities" published by Oregon State University—that the development of on-campus abilities is very important. We suggest that it might be appropriate for NSF to consider continuing support—in institutions having some hardware capability—of computing by grants explicitly for travel and faculty development related to computer applications.

While significant progress has been made, we are by no means using our hardware to the fullest. We expect continued expansion of applications, both in number and in quantity of usage per application. At the present time, it appears that the computer is regarded as a valuable resource of the college and one worthy of support at least at the present level. Because the central processing unit was purchased, we are somewhat committed to the 1130 for a number of years to come; we do not regard this as a major problem. The input/output equipment is leased and can be upgraded to higher speeds if the need should arise. If more computing power is needed, we feel that we are most likely to add communications hardware to the 1130; the cost of such hardware is far less than that of a significantly more powerful computer—at least at the present. (1969-70)

For the most part, the comments in this section in last year's report still seem to be valid. Computers are difficult to use meaningfully, systems are **not** user oriented, and good instructional programs are hard to get.

The installation of the plotter has been helpful, though it has not been exploited fully. In spite of a special description of how it can be used, very few people make use of it in their own programs until they are rather accomplished programmers. On the other hand, experienced programmers **do** use it routinely—especially in demonstration programs in which graphical output is the natural presentation.

There is a fundamental problem which limits the expansion of computer use among undergraduates and inexperienced faculty: if a program is to be run only once or twice, it is easier in most cases to do the calculation by hand than to program it. We have repeatedly encountered this situation in our promotional attempts; upon learning what is involved, students and faculty tend to conclude that the effort to program a problem is excessive. This is often true, since in educational situations one tends to consider a subject or a problem briefly and then move to something else. For the most part, the sorts of problems which are considered in typical classroom situations (including the sciences) come from many years of a selection process which has produced problems soluble by hand. Motivation for programming their solutions can be difficult.

We do have a number of students and faculty members who have become quite interested in the machine and expert with it. In practice, it appears at present

that the expansion of our usage depends upon the interests of these individuals and the time they have available for promotion. One should keep in mind here that, in a four-year college situation, teaching loads are apt to be heavy. This limits the amount of time a faculty member can devote to development of computer applications (or any other development, for that matter). We anticipate a continuation of the expansion of usage of the machine, though a number of years will be required even to work out the ideas we have now. (1970-71)

Eastern Mennonite College:

Chem 422 Chemistry Seminar (Independent Study)—A student has developed a program for computing the conformational energies of cyclic hydrocarbons and determining the conformation of minimum energy. This makes available a rather flexible program for these computations which will run on a small computer (IBM 1130).

Chemistry Research—The computer is used routinely in analyzing and plotting kinetic data being obtained in a current research project.

Demonstration Programs—One of our students wrote a program which has all the letters of the alphabet and all the numbers stored in core. Entering the desired character on the typewriter will produce a printout of the character 12 inches wide. One character can be entered at a time, or with a slight modification 100 characters can be entered before the printer takes off.

Another demonstration program written by one of our students will respond to a person's birth date by giving the day of the week on which he or she was born. I believe this program is more exciting than any other demonstration we have come up with.

Programs to Analyze Questionnaires—A number of different programs have been written to evaluate data from questionnaires.

One program evaluates up to 130 questions with 26 options for each question. Another program can accept multiple answers per question. Another program plots the number of responses for each question and prints the total number of responses. Another program accepts Porta Punch cards as input. These are a few examples. (1969-70)

Traditionally, education has been conducted in a lock-step method. All students progress at the same pace whether they are capable of moving twice as fast or have difficulty in keeping up. The student capable of moving ahead at a faster pace often becomes bored while the slower student experiences repeated failures through his entire educational experience and is handicapped by a cumulative deficit of information.

Dr. John H. Hess, Jr., Head of the Psychology Department at EMC, is administering an introductory course based on operant learning principles. Fred S. Keller developed the course format which Independent Learning Systems, Inc., of San Rafael, California, produces commercially.

The course consists of 13 units, each dealing with a major area of psychology. Within an unit, each short section of narrative material is followed by a set of exercises and review questions which are graded on the computer. The exercises and review questions insure active student participation in learning the material.

Because students will work at the pace best suited to their ability, the computer must grade different tests at the same time. It will sort the answer cards submitted to it and print out the key and wrong answers for each student.

Instead of depersonalizing faculty-student relations, as computers are so often accused of doing, the program will improve relations. The teacher will be able to have individual sessions with each student in order to go over the wrong answers. The student will spend more time in interchange with his teacher, and he will be bound only by his own progress, not by time or any other student.

This approach to learning is being tested as a pilot project in the Psychology Department and will then be available for other departments at EMC.

For 50 years we have talked about individual instruction, but very little has been done effectively in this area until the era of the computer.

A series of 23 different programs developed by Loyola College (Md) for time-sharing terminals was converted by EMC's senior physics major Rich Landes for use on the IBM 1130 Computer.

The computer also proved to be a very valuable assistant during an alumni fund raising campaign. The Development and Alumni Offices use the facilities for mailing list purposes maintaining a 25,000 record file. (1970-71)

Fairmont State College:

The year of activity with an on-campus computer can be conservatively described as a complete success. The college has decided to continue its present level of computer activity when outside funding ceases. More immediate evidence of success is the volume of utilization of the facility in instruction. The computer has been directly responsible for the addition of new classes or permanent alteration of existing classes in at least six separate instances.

In summary, the IBM 1130 computer facility on the Fairmont State College campus has, in less than nine months, affected the entire undergraduate program of instruction and become an indispensable facet of the institution. The facility has provided a greater contribution to academic improvement and program growth than any other single development in the institution's history. (1968-69)

The computer facility has been a major factor in the recruitment of quality students and faculty to the college in a number of instances.

A significant number of students and faculty have begun using the computer for individual projects and problem solution after introduction in classes formally using the computer. The largest increase has been in instructional use and in individual projects and applications.

Increased demands on the computer facility have forced the addition of a terminal connection with a larger computer system to accommodate growing academic applications.

A formal 2-year computer science major is now in the planning stage for introduction in 1972.

Administrative application has increased. A faster printer has become necessary for addition July 1, 1971. (1970-71)

Transylvania College:

One of our academic objectives at Transylvania is to teach all students something about the computer before graduation. To help fulfill this objective a compiler which does not require format specification by the programmer for input and output was developed. The compiler was patterned after the IBM 1620 GO TRAN compiler. It has been found that after two hours of lecture students can be punching and running their own program with the aid of the GO TRAN compiler. (1970-71)

Case Studies | 7

The purpose of this chapter is to give the reader an over-all view of the institutions which participated in this research. Each case study is presented in three sections: the first describes the institution itself and its computing facilities, next is a year-by-year narrative of experiences while participating, and finally some graphs present data pertaining to the use of computers on that campus. This format has been departed from slightly with regard to the institutions under Method C, Cooperative Use of Small Computers with Other Colleges. In this instance the first section (institutional description) for each of the five colleges is presented sequentially followed by one listing of the computing facilities, with sections two (narrative) and three (graphs) combined for the whole group.

The case studies are presented in the same order as used elsewhere in this report. For additional details the reader must also refer to Chapters 4, 5, 6, 8, 9.

Loyola College

Financial Support:	
Student Fees	88%
Private Grants and Appropriations	9%
Public Grants	3%
Enrollment: (Fall 1968)	872
Fulltime	100%
Undergraduate	100%
Men	100%
Degrees: Bachelor (1966-67)	
Science	74
Other	111
Term: Two semesters plus summer session	
Faculty: Fulltime	70
Earned Doctorate	35%
Computing Facilities Prior to Project:	
ASR-33 teletype to a commercial time-sharing service since 1967	
Computing Facilities at Start of Project:	
Equipment	
ASR-33 teletype to a commercial time-sharing service	
Space - 288 sq. ft.	
Personnel - (in FTE's)	
Center Director	.25
Other Professional	.50
Other Staff	.00
Expenditures - (1968-69)	$14,531
Type of Use Percentage - (1968-69)	
Instructional	100%
Research	0%
Administrative	0%

Located in Baltimore, Maryland, Loyola College is a private, liberal arts college for men under the control of the Society of Jesus of the Roman Catholic Church.

Currently occupying a 10 acre campus in a residential area of the city, the college is the ninth of the surviving American Jesuit Collegiate foundations and the first to bear the name of the founder of the Society of Jesus.

The college was established in 1852 and opened with a class of 90 students. It has occupied several locations in Baltimore during its existence. Evening classes were begun in 1942 and graduate classes seven years later.

Neither the Evening College nor the Graduate College was involved directly with this project. They both are co-educational and part-time. During the 1968-69 academic year less than 2,000 students (not FTE's) were involved, with 71 percent being male and 62 percent undergraduate. The faculty involved, excluding those from the regular college, are mostly part-time.

Academic accreditation has been extended by the Middle States Association of Colleges and Secondary Schools, the Maryland State Department of Education, and the Regents of the University of the State of New York.

Students may earn the A.B., B.S., M.Ed., and M.A. in majors such as accounting, biology, business administration, chemistry, economics, education, English, history, Latin, mathematics, modern languages, physics, physics-engineering, political science, psychology, and sociology.

Ninety percent of the students come from communities within Maryland and one percent from foreign countries. The typical student needed approximately $2100 for tuition, fees, room and board for the 1968-69 academic year (two semesters).

Prior to July 1, 1968, some programming courses were taught by faculty of the Physics and Engineering Department with the programs being run at local industrial plants. One ASR-33 teletype connected to a commercial time-sharing service was rented in January

1967. It was used only by some of the students in the Physics and Engineering Department under the direction of three faculty members.

1968-69

Use of the terminal was mandatory or encouraged in a Principles of Growth course and in ten other courses, all in the Physics and Engineering Department. Faculty members from economics, chemistry, mathematics, and philosophy also used the facilities to a significant degree.

A second terminal was purchased during the first year to permit more off-line capabilities.

The only major operational problem during the first year was the "down-time" of the central computer.

1969-70

A third terminal was added for off-line preparation of the tape due to the increased student use of the facilities, especially between 9:00 a.m. and 5:00 p.m. In addition space was rearranged to house the terminals separately and provide a small preparation room. Prior to this the terminals were part of a large laboratory used for several activities.

The major problem was the significant decrease in the quality of service from the time-sharing vendor.

1970-71

Instructional uses of the facilities continued to increase. All courses in the curriculum had to be revised in preparation for a change to a 4-1-4 academic program to begin with the 1971-72 year. Some of the instructors used this opportunity to incorporate computer use into their courses.

The major change in operations involved a switch to another time-sharing vendor for more favorable rates. The change was from Call-A-Computer to Leasco. Another on-line teletype was added and placed in the economics building. This brought the number of terminals to three on-line and one off-line for tape preparation. Although the formal staffing remained the same, a faculty member in business administration became more active with the facilities.

The only major problem arose when a salesman with the time-sharing vendor wrote a contract with unauthorized rates and then left the company.

The Future

Rising costs of equipment rental and computer time rates plus increased use of the facilities led to the decision to purchase a mini-computer. The budget for 1971-72 was originally set at $19,500 (85 percent increase over 1970-71). Increasing the budget to $25,000 for each of the next three years would permit the purchase of a PDP-11 costing about $65,000 with peripherals.

Official College Statement

As a result of a study made in 1966 by a faculty committee, Loyola College determined the following plan:

1. Start small and encourage the growth of the computer on campus by attracting interested students and faculty members to use it.

2. Encourage the administration to use the computer for daily operations and thus cut costs in its operations.

3. Find some outside financial support while statistics are being gathered.

In January 1967 Loyola entered into a working agreement with the Johns Hopkins University to rent computer time on a time-sharing basis. As a result of this experience a proposal was submitted to the National Science Foundation to participate in a two-year study under the auspices of the Southern Regional Education Board (SREB).

During this two-year study, a number of interesting discoveries were made. Chief among these was the tremendous educational value of time-sharing in the conversational mode when it comes to teaching students how to program a large computer.

During the past three years, the following stand out:

1. Mr. Wolsey has been on loan part of the time from the Physics Department to the administration offices of the college to computerize operations in the Comptroller's Office and the Registrar's Office. With the aid of free use of an IBM 1130 at the J.E. Griener Company, the administrative offices are experiencing the advantages of computerizing their operations.

2. Four different three-credit courses are being offered by Loyola College in computer programming and applications. One of these is for liberal arts majors and is offered each semester. The response has been encouraging. Over 200 students at the college have used the computer in these first 20 months.

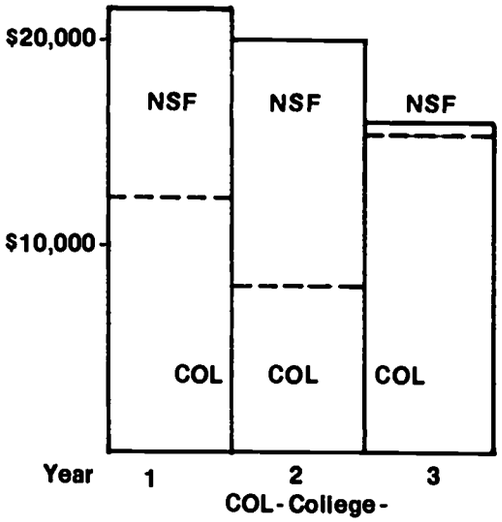
3. The teletype terminal is in contact with the computer for approximately 100 to 120 hours each month. The total number of hours the students and the faculty are punching programs, etc. is about three times this amount. This necessitated buying one extra terminal and renting a third. All three teletypes are frequently in use at the same time. Thus our facilities are used about 300 to 360 hours each month, an average of 10 to 12 hours each day, including weekends.

4. Student in physics and engineering are using the facility in all aspects of their courses and laboratories. Other departments are starting to use the facility. Chief among these are the Chemistry, Economics, Business Administration, Mathematics, and Philosophy Departments.

5. Students are solving problems now that they never could solve before, and they are enjoying doing it. Thus our courses have taken on a new dimension and our laboratories are more professional.

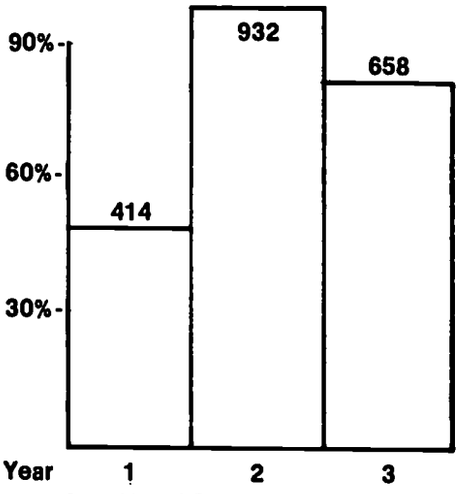
Fr. Joseph A. Sellinger
President

Total Computing Expenditures

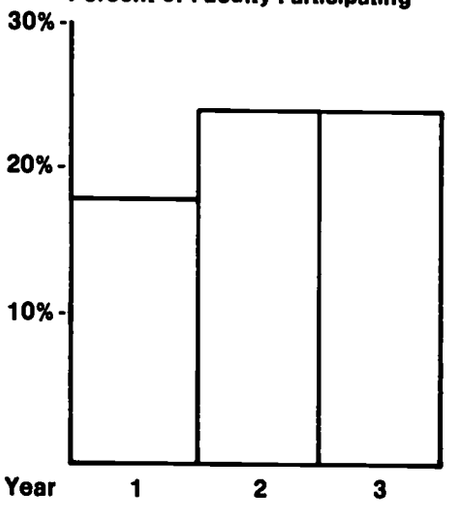


Cost Per Registered Student

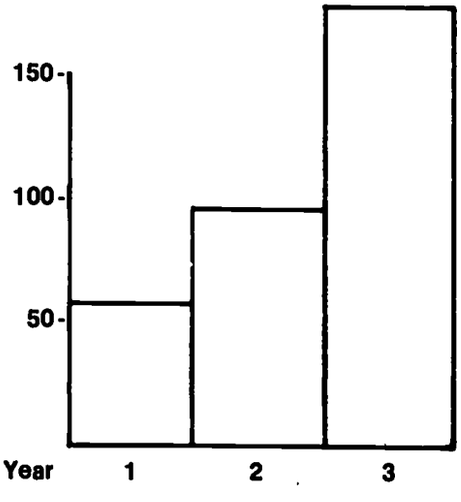
Students Participating*



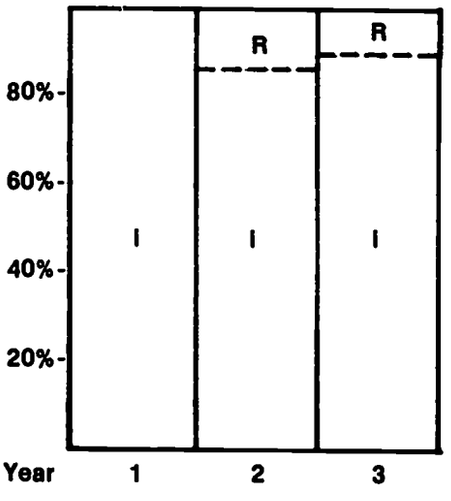
Percent of Faculty Participating



Avg. No. of Console Hrs. Per Month (Hrs. terminal in use) for Instruction and Research



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

*These figures are inflated primarily due to the fact that the college enrollment data did not include the evening school, but the facilities were used by evening school students.

Maryville College

Financial Support:
- Student Fees 88%
- Public Grants 6%
- Private Grants and Gifts 6%

Enrollment: (Fall 1968) 757
- Fulltime 99%
- Undergraduate 100%
- Men 45%

Degrees: Bachelor (1966-67)
- Science 51
- Other 67

Term: Three quarters plus an interim and summer session

Faculty: Fulltime 53
- Earned Doctorate 37%

Computing Facilities Prior to Project:
Student Programs were run at the University of Tennessee

Computing Facilities at Start of Project:
- Equipment
  - ASR-33 teletype to a commercial time-sharing service
- Space - 300 sq. ft.
- Personnel - (in FTE's)
  - Center Director ..... .33
  - Other Professional ..... .00
  - Other Staff ..... .20
- Expenditures - (1968-69) $13,101
- Type of Use Percentage - (1968-69)
  - Instructional 100%
  - Research 0%
  - Administrative 0%

Located in Maryville, Tennessee, Maryville College is a private, co-educational liberal arts institution. It is under the control of the United Presbyterian Church in the U.S.A.

Currently occupying a 375 acre campus at the edge of the city, the college originated with the establishment of the Western Theological Seminary in 1819.

During the Civil War the college closed since both students and faculty entered military service. The buildings were destroyed during the war. In 1925 the Preparatory Department was closed with all effort being directed toward the development of the college.

Academic accreditation has been extended by the Southern Association of Colleges and Schools, the National Association of Schools of Music, and the Tennessee State Department of Education.

Students may earn the B.A. in art, biology, chemistry, economics, English, elementary education, foreign languages, history, mathematics, medical technology, music, physics, political science, psychology, religion, or sociology.

Twenty-eight percent of the students come from communities within Tennessee and three percent from foreign countries. The typical student needed approximately $1900 for tuition, fees, room and board for the 1968-69 academic year (not including summer).

Prior to July 1, 1968, there were no computing facilities on campus. During the 1967-68 academic year one programming course was taught. The student programs were punched on the card punch on campus and then run on the computer at the University of Tennessee in Knoxville.

1968-69

Two required freshman courses utilized the facilities in various activities ranging from a demonstration to the solving of simple problems. An introductory pro-

gramming course used the terminal, whereas previously the student programs were transported to an off-campus computer for processing. Physics students were given some in-class instruction on terminal use and programming, and a mathematics course used it for problem solving. In addition, several non-credit seminars were held for both students and faculty.

During the spring term a second ASR-33 was acquired. This one is mobile and is equipped with an acoustical coupler enabling it to be used in a classroom. When not in use in a classroom as a terminal its primary role is for off-line paper tape preparation. Such use allows more efficient utilization of the on-line terminal.

No particular problems were encountered during the first year with regard to installation and operation of the terminal.

1969-70

The major problem encountered was that of deteriorating service from the time-sharing vendor.

1970-71

A major change was made in equipment and operations when the college received an additional grant from the NSF to participate in a different project. The new effort, which is titled "An Experiment on Utilizing Mini and Very Small Computers for Instructional Uses" (NSF Grants 1072 and 1111), is also administered by SREB. Under this experiment the terminal facility was replaced by an on-campus mini-computer (H-P 2114B).

The Future

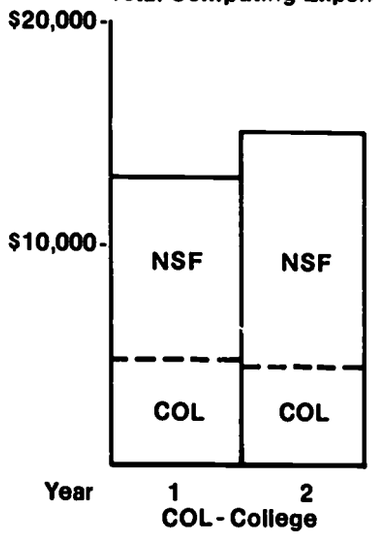
The activities will remain much the same, except for an increase in use, for the next several years. The new grant runs through the 1973-74 academic year.

Official College Statement

Since computers are becoming a vital part of our society, they will fast become a vital part of our educational systems. The biggest impact of computers on campus is the discovery that they are not used exclusively in computer training but more as a learning resource. In a period of only two years, our computer has become a tool or aid to learning in many (about 10) of our other courses. Thus, if computing service were removed from our campus, it would be somewhat like reducing an important library service.

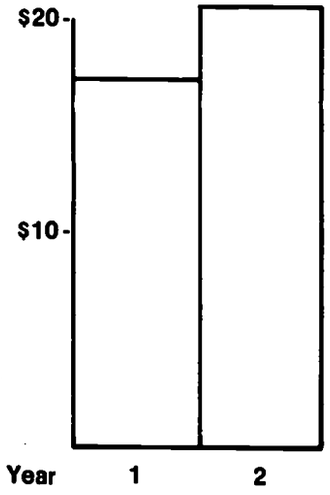
Joseph J. Copeland
President

Total Computing Expenditures

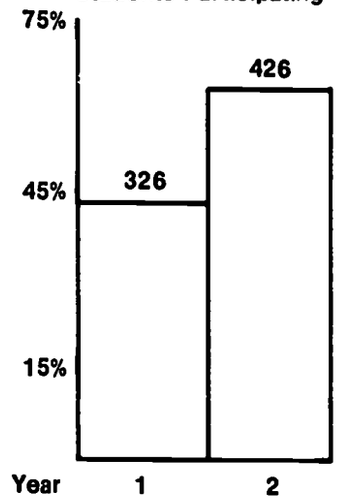


COL - College

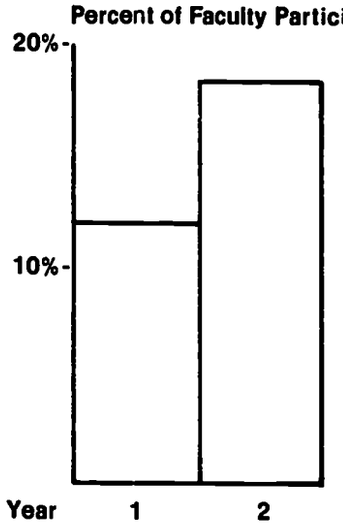
Cost Per Registered Student



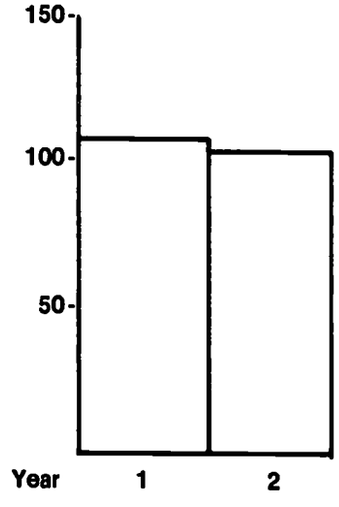
Students Participating



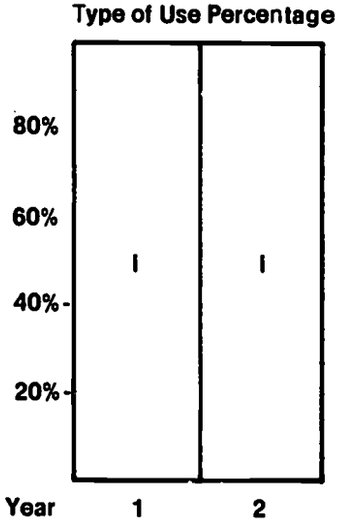
Percent of Faculty Participating



Avg. No. of Console Hrs. Per Month (Hrs. terminal in use) for Instruction and Research



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

Wofford College

Financial Support:
- Student Fees 74%
- Private Grants 26%

Enrollment: (Fall 1968) 1013
- Fulltime 99%
- Undergraduate 100%
- Men 100%

Degrees: Bachelor (1966-67)
- Science 135
- Other 73

Term: 4-1-4 (mos.) plus summer session

Faculty: Fulltime 54
- Earned Doctorate 50%

Computing Facilities Prior to Project:
Very limited use of a time-sharing service

Computing Facilities at Start of Project:
- Equipment
  - ASR-33 Teletype to a commercial time-sharing service
- Space - 150 sq. ft.
- Personnel - (in FTE's)
  - Center Director ..... .33
  - Other Professional ..... .00
  - Other Staff ..... .15
- Expenditures - (1968-69) $14,531
- Type of Use Percentage - (1968-69)
  - Instructional 100%
  - Research 0%
  - Administrative 0%

Located in Spartanburg, South Carolina, Wofford is a private, liberal arts college for men. It is under the control of the United Methodist Church.

Currently occupying a 75 acre campus in a residential area of the city, the college was founded in 1851.

The first classes were not held until 1854, but they have continued ever since, although quite limited during the Civil War. The college's endowment was completely lost during the war; however, the South Carolina Conference met the emergency and re-established its financial basis.

Academic accreditation has been extended by the Southern Association of Colleges and Schools.

Students may earn the A.B. and B.S. degrees in biology, chemistry, economics, English, foreign languages, government, history, mathematics, philosophy, physics, psychology, religion, and sociology.

Seventy-two percent of the students come from communities within South Carolina and less than one percent from foreign countries. The typical student needed approximately $2300 for tuition, fees, room and board for the 1968-69 academic year (not including summer).

Prior to July 1, 1968, the college had only unit record equipment under the direction of the Business Office plus a very limited use of a time-sharing service. Its activity was almost exclusively for financial accounting plus some student record keeping.

1968-69

Instructional use was limited to existing courses rather than implementing new ones. A one-month project between the regular terms used the terminal extensively, and one section of an introductory science course became strongly computer-oriented. In addition, the terminal was used for an international relations situation as part of an honors project in government and for computations in several science and mathematics courses.

The only change in equipment and/or operations was the shift from one time-sharing center to another within the same corporation in order to share in a common library with Loyola College and Maryville College. The switch did not have any negative effects.

Three major problems were encountered during the

initial year of operation. The amount of time required for the management of a terminal installation was underestimated. The amount of "down-time" of the supplier of the time-sharing services was greater than anticipated. Further, overloaded system conditions during peak hours often forced users into late evening or early morning operations.

1969-70

A second ASR 33 terminal was purchased for basic use as an off-line tape preparation unit to permit more efficient use of an on-line unit. It can also be used on-line if necessary. A Hewlett-Packard 7200-A graphic plotter was ordered.

A continuing problem was the lack of proper staffing. Even with a terminal facility, faculty needed considerable assistance, and "down-time" from the central computer increased. Another terminal related problem was that of data transmission errors which, among other things, dampen the enthusiasm of users, especially the less experienced.

1970-71

The terminal facilities continued to be used as integral parts of several courses in the sciences, mathematics, and psychology. Furthermore, two new courses relating specifically to computers were introduced. The first is a three-credit course, "Computer Appreciation." It is designed as an introduction to computer concepts, is open to all students, and has no prerequisites. The second is a one-credit "how to" course designed to teach the student use of the terminal, the plotter, and some programming. This latter course is intended to be a prerequisite to several courses in which students are now expected to make some use of the computing facilities.

The major change in equipment and/or operations involved the installation of a H-P 7200-A plotter. In addition, faculty released time is no longer calculated for operation of the terminal facilities.

No significant operational problems were encountered this year.

The Future

The present plans are to continue operating with the present equipment; however, consideration is being given to a larger room with direct access to a hallway. The college is following the progress of the minicomputer experiment (see the narrative for 1970-71 of the case study of Maryville College) with great interest. This interest has been generated by conclusions drawn from our own experience:

- One on-line terminal is easily overloaded.
- A remote terminal does not facilitate the study of the computer itself.
- Very little administrative work can be done with a teletype terminal facility.
- An on-campus computer might save money.

Official College Statement

The presence of computing facilities on the Wofford College campus continues to have a favorable impact on our educational program. According to our best estimates between 10 and 20 percent of our total student body came into constructive contact with our computer terminal each year. In addition, several of our courses have undergone a change in emphasis and have been directly influenced by the presence of the terminal. Indeed, two new computer courses were introduced into our curriculum in 1970-71.

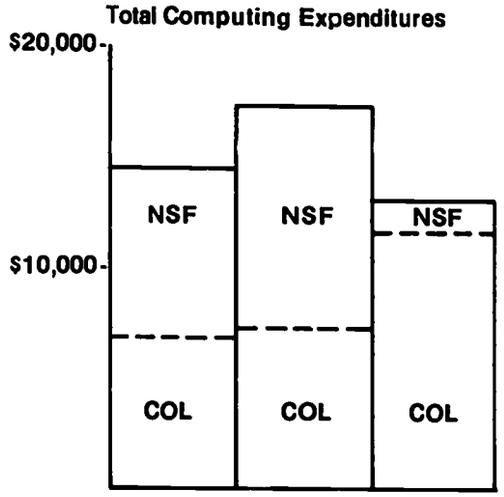
We feel that the computer terminal will be even more important in the future. We hope to use it during the next academic year for some administrative research in aid of long range planning.

Present usage is at a high rate. Our teletype terminal will have been in actual use more than 1650 hours during the 12-month period June 1, 1970 - May 31, 1971. This is an average of more than 4.5 hours per day. We still see students at work in our computer center late in the evening and on weekends—doing optional work as well as work required in their courses.

In sum, the students, faculty, administration, and Board of Trustees at Wofford College are convinced that the computer terminal has been a useful addition to our campus facilities.

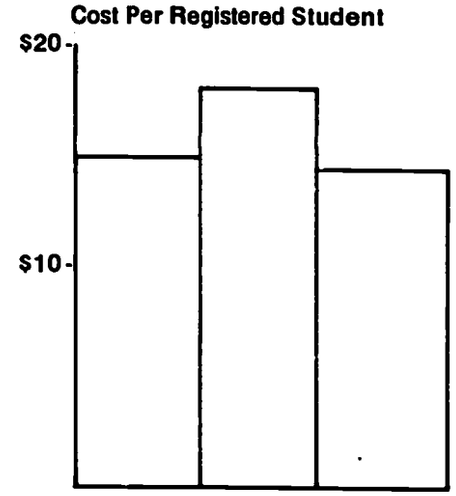
Paul Hardin, III
President

Total Computing Expenditures

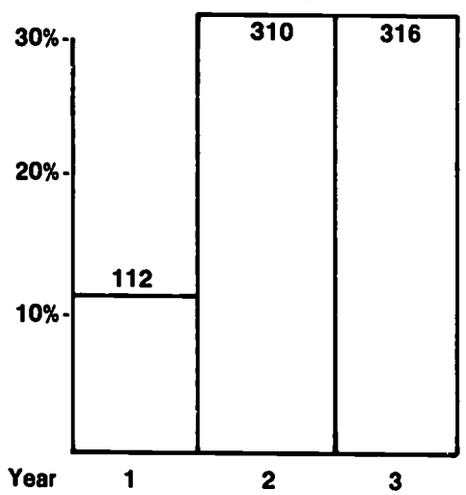


COL - College

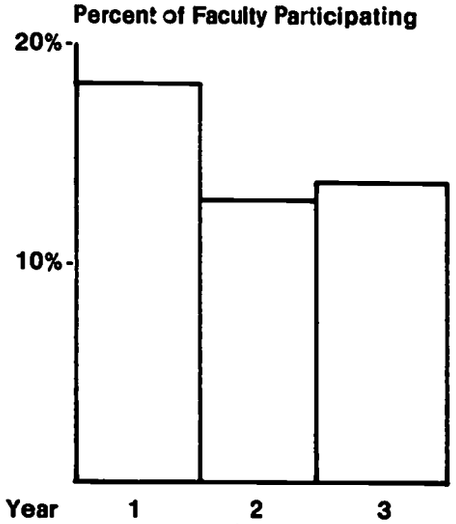
Cost Per Registered Student



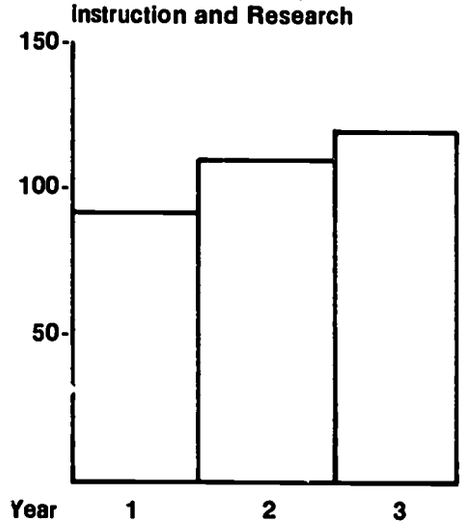
Students Participating



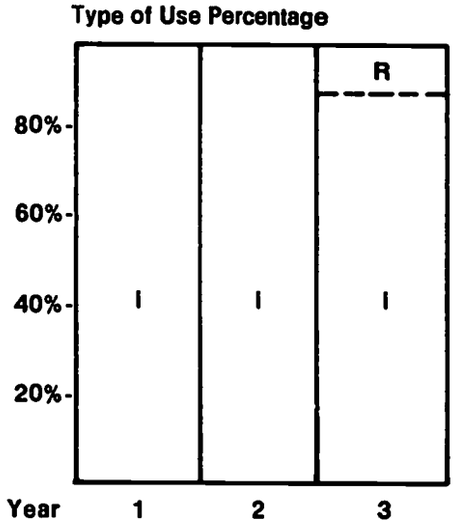
Percent of Faculty Participating



Avg. No. of Console Hrs. Per Month (Hrs. terminal in use) for Instruction and Research



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

Huntingdon College

Financial Support:
- Student Fees 75%
- Private Gifts and Endowments 18%
- Private Appropriations 7%

Enrollment: (Fall 1969) 770
- Fulltime 93%
- Undergraduate 100%
- Men 39%

Degrees: Bachelor (1967-68)
- Science 52
- Other 154

Term: Two semesters plus summer session

Faculty: Fulltime 46
- Earned Doctorate 31%

Computing Facilities Prior to Project:
- None

Computing Facilities at Start of Project:
- Equipment
  - IBM 2741 terminal to Auburn University
- Space - 150 sq. ft.
- Personnel - (in FTE's)
  - Center Director ..... .25
  - Other Professional ..... .25
  - Other Staff ..... .00
- Expenditures - (1969-70) $10,788
- Type of Use Percentage - (1969-70)
  - Instructional 100%
  - Research 0%
  - Administrative 0%

Located in Montgomery, Alabama, Huntingdon College is a private, co-educational liberal arts college. It is under the control of the United Methodist Church.

Currently occupying a 58 acre campus in a residential area of the city, the college's existence dates from 1854. It was in that year that Alabama chartered the Tuskegee Female College. In 1872 the property of the school was purchased by the Alabama Conference of the Methodist Episcopal Church, South.

The college moved to Montgomery in 1909 and changed its name to the Woman's College of Alabama. Its present name was made official in 1935, three years after the institution admitted its first male student. It was not until the close of World War II, however, that males became a significant proportion of the student enrollment.

Academic accreditation has been extended by the Southern Association of Colleges and Schools.

Students may earn the B.A., B.S., and B.M. in accounting, applied music, art, biology, business administration, chemistry, Christian education, drama, economics, elementary education, English, French, German, history, library services, mathematics, medical technology, museum staff preparation, music, literature, music theory, organ, physics, piano, premedicine, psychology, secondary education, social welfare, sociology, Spanish, speech, theology, violin, and voice.

Seventy-four percent of the students come from communities within Alabama and 26 percent from other states. The typical student needed approximately $1900 for tuition, fees, room and board for the 1969-70 academic year (two semesters).

Prior to July 1, 1969, the only data processing facilities were in the office of the Dean of the college and were used for administrative applications. Some of the equipment was used, however, during part of one semester each year for a beginning course in data processing.

1969-70

The major change this year was to a different supplier of remote computing service. The shift, which took place at the first of this year, was made to an ASR-35 teletype terminal to United Computing Services, Inc.

Major problems were limited access time, lack of development of Auburn University's remote service, and a delay in FX-line installation between Huntingdon and Auburn. These problems necessitated the switch in remote-service supplier.

1970-71

A major change was the addition to the core curriculum of a new course, "Man and the Scientific Age." A part of this new instructional effort will be devoted to a study of the computer. Six other courses utilized the terminal facilities; four in science and mathematics and one each in economics and marketing.

There were no changes in equipment or operations and the only real problem was the length of time users sometimes had to wait to gain access to the teletype. This was caused by increased use and the lack of a second terminal.

The Future

The present arrangements will be continued until improved facilities can be provided.

Official College Statement

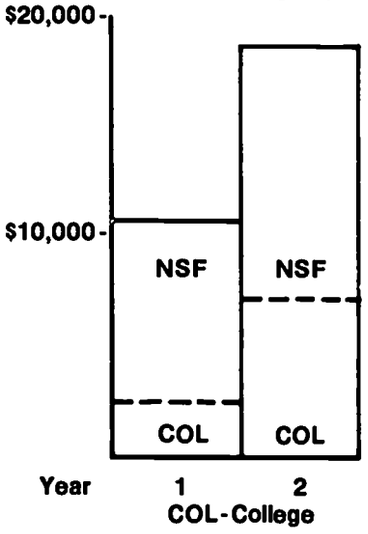
By participating in the project, "An Experiment in Ways of Supplying Computer Facilities to Small Colleges for Instructional Uses," the faculty of Huntingdon College has developed an awareness of the impact of the computer upon education. Several faculty members are actively engaged in innovative applications of the computer in the classroom.

The project has led to the inclusion in the core curriculum of several weeks of study of the computer. It is felt that this will better enable students to relate to the world of today.

The impact of the project upon the student body is best reflected in their conversations regarding applications in all disciplines. Enrollment in the computer courses is now spread among all disciplines whereas it formerly was predominantly science majors.

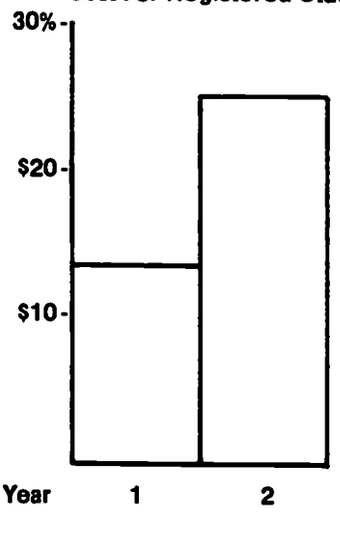
Allen K. Jackson
President

Total Computing Expenditures

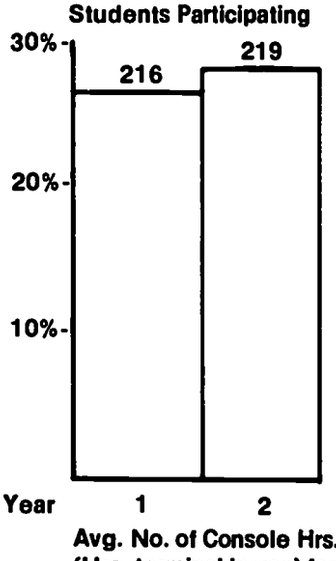


COL-College

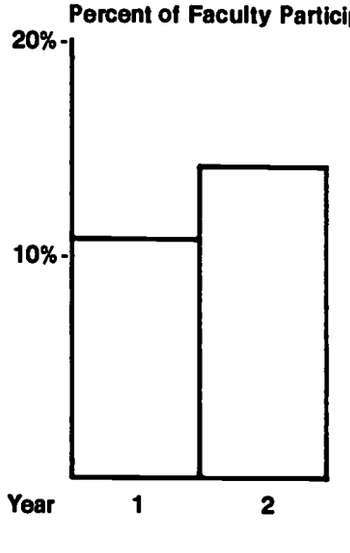
Cost Per Registered Student



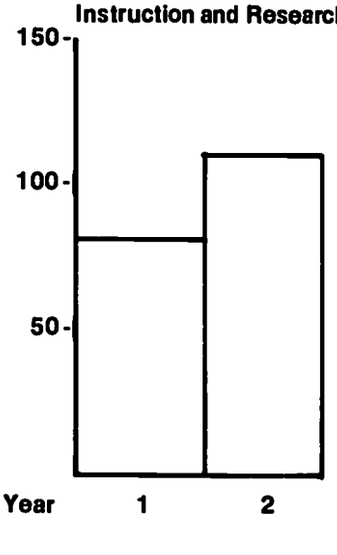
Students Participating



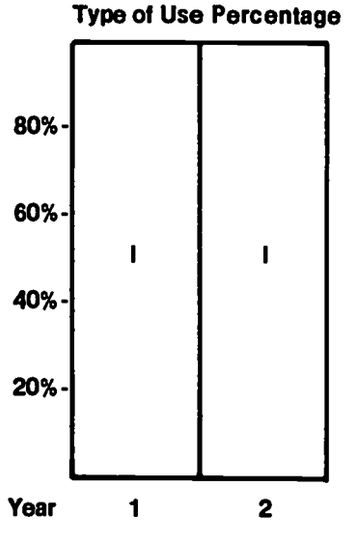
Percent of Faculty Participating



Avg. No. of Console Hrs. Per Month (Hrs. terminal in use) for Instruction and Research



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

Millsaps College

Financial Support:

Student Fees	70%
Private Appropriations	19%
Public Grants	8%
Private Grants	2%

Enrollment: (Fall 1969) 979

Fulltime	92%
Undergraduate	100%
Men	51%

Degrees: Bachelor (1967-68)

Science	86
Other	114

Term: Two semesters plus summer session

Faculty: Fulltime 64

Earned Doctorate	36%

Computing Facilities Prior to Project:
None

Computing Facilities at Start of Project:
Equipment
Two ASR-33 Teletypes to a commercial time-sharing service.
Space - 250 sq. ft.
Personnel - (in FTE's)

Center Director	.25
Other Professional	.25
Other Staff	.00

Expenditures - (1969-70) $15,712
Type of Use Percentage - (1969-70)

Instructional	100%
Research	0%
Administrative	0%

Located in Jackson, Mississippi, Millsaps College is a private, co-educational liberal arts college. It is related to the Mississippi and North Mississippi Conference of the United Methodist Church.

Currently occupying a 96 acre campus in a residential area of the city, the college's existence dates from 1890. It was in that year that the Methodist Episcopal Church South established a college for men. It was named after Major Reuben Webster Millsaps who gave the first endowment to the institution. The first classes were held in 1892 and the first women were admitted in 1899.

Academic accreditation has been extended by the Southern Association of Colleges and Schools.

Students may earn the B.A., B.S., or B.M. in such fields as accounting, biology, business administration, chemistry, economics, elementary education, English, French, geology, German, history, Latin, mathematics, music education, organ, philosophy, physics and astronomy, piano, political science, psychology, psychology-sociology, religion, sociology, Spanish, speech and theatre, and voice.

Eighty-one percent of the students come from communities within Mississippi and about one percent from foreign countries. The typical student needed approximately $1960 for tuition, fees, room and board for the 1969-70 academic year (two semesters).

Prior to July 1, 1969, the Business Office utilized a small unit record operation but no computer facilities.

1969-70

A change was made to a different time-sharing vendor in January due to a policy change on the part of the original supplier which eliminated the "unlimited use contract."

First-year problems were mostly in the area of personnel. The arrangements for an instructor of the programming course were not completed until late in August, 1969. The original Principal Investigator left the campus during the summer and his replacement was called into active military duty late in April.

1970-71

The terminal facilities were utilized by students in twenty-seven courses, only two of which were computer courses per se. In the six mathematics courses the use was for problem solving, with the students writing from five to thirty programs per course. In physics (six courses), computer usage was usually optional and most often used for laboratory data analysis. In some of the eight chemistry courses using the terminals, computer usage was mandatory while in others it was optional. All of the chemistry applications were either for problem solving or data analysis. Students in economics courses (three) were all required to run programs to simulate or solve problems, as were the students from an accounting course. A political science course had students performing a statistical calculation of a legislative roll call.

The only change made in operations was the moving of one terminal to another building, with no problems encountered.

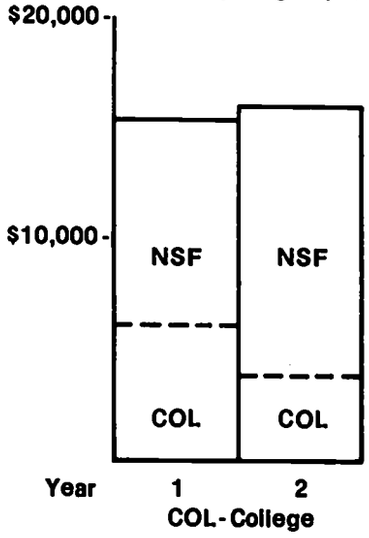
The Future

It has been decided to purchase a mini-computer to replace the off-campus source of time sharing services. A PDP-8/E with DEC tape and two teletypes is on order.

Official College Statement

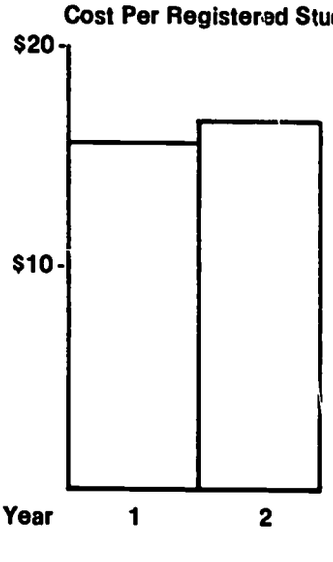
No statement was available due to a recent change in presidents.

Total Computing Expenditures

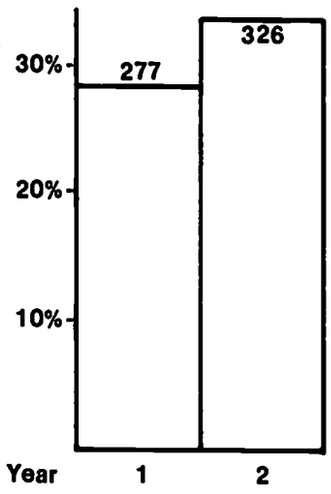


COL - College

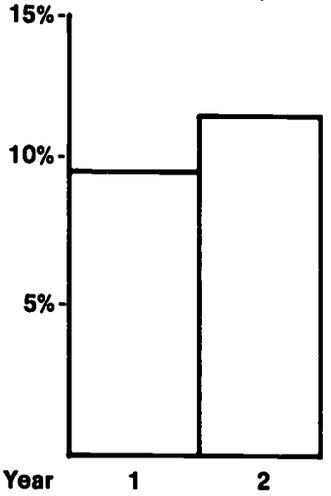
Cost Per Registered Student



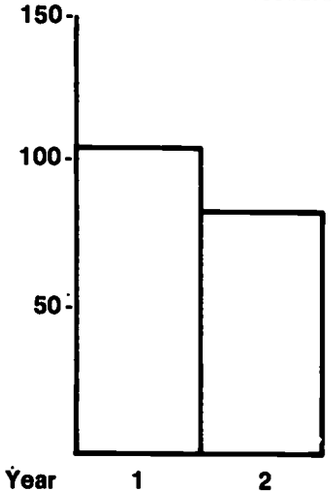
Students Participating



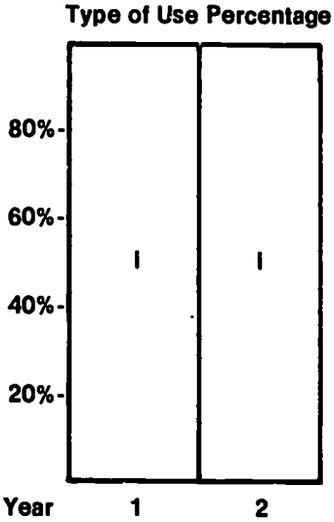
Percent of Faculty Participating



Avg. No. Console Hrs. Per Month (Hrs. terminal in use) for Instruction and Research



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

Mississippi Valley State College

Financial Support:
- State Appropriations 58%
- Student Fees 38%
- Public Grants 4%

Enrollment: (Fall 1969) 2282
- Fulltime 99%
- Undergraduate 100%
- Men 48%

Degrees: (1967-68)
- Science
  - Associate 14
  - Bachelor 28
- Total Science 42
- Other
  - Bachelor 267

Term: Two semesters plus summer session

Faculty: Fulltime 102
- Earned Doctorate 9%

Computing Facilities Prior to Project:
- IBM 360/20-8K card system for administrative uses

Computing Facilities at Start of Project:
- Equipment
  - IBM 1050 terminal to the Mississippi Research and Development Center
  - Card Punch (1)
- Space - 700 sq. ft.
- Personnel - (in FTE's)
  - Center Director ..... .50
  - Other Professional ..... .00
  - Other Staff ..... .00
- Expenditures - (1969-70) $15,037
- Type of Use Percentage - (1969-70)
  - Instructional 100%
  - Research 0%
  - Administrative 0%

Located about one mile from Itta Bena, Mississippi, Mississippi Valley State College is a state supported, co-educational institution. It is under the control of the Board of Trustees of the State Institutions of Higher Learning.

Currently occupying a 450 acre campus in a rural setting, the college's existence dates from 1946. In that year the Mississippi Legislature chartered the Mississippi Vocational College for the purpose of preparing teachers for Negro schools and to provide vocational training for Negro students. The college's curricula have expanded beyond its original charter. The present site, a former plantation, was purchased in 1949, and the present name was acquired in 1964.

Academic accreditation has been extended by the Southern Association of Colleges and Schools and the College Accreditating Agency of Mississippi.

Students may earn the Associate in applied science, B.S., or B.A. degree. The baccalureate majors are art, business, elementary education, industrial arts education, modern language, music, natural science and mathematics, nursing education, social science, and speech.

Ninety-four percent of the students come from communities within Mississippi and less than one percent from foreign countries. The typical student needed approximately $800 for tuition, fees, room and board for the 1969-70 academic year (two semesters).

Prior to July 1, 1969, there were no instructional activities using a computer. The Business Office had an IBM 360/20-8K Card System for administrative uses only.

1969-70

No major changes were made in operations during this year.

Four major problems arose, three of which continue to exist. Initially the prime trouble area involved the late (by three weeks) installation of the telephone line. The persistent problems are some long turn-around times, very inadequate staff, and the lack of understanding by the faculty of the usefulness and need for the facility.

1970-71

Several new courses were introduced this year giving the students exposure to various languages and three different computer systems. The languages included FORTRAN, COBOL, RPG, and one for a desk top computer, while the computers included an IBM 360/20 and a Programma 101 in addition to the terminal facility. Some of these courses are now required for a few majors. Student and faculty use increased both in terms of computer time and in diversity of uses.

The major changes in operation were the addition of another language capability to the terminal (PL/I), COBOL processing via an off-campus system, and the availability of the Programma 101 for student use.

No major problems were encountered; however, some minor hardware failures did occur occasionally.

The Future

Use of the facilities will continue to increase, and a key punch operator will be added to the staff. Work will commence shortly on a new building which will provide additional space for the Computer Center. The college is currently developing a plan for new computing equipment and a new management organization to operate it. The plan will probably dictate central management of a larger computer to be used for instructional and administrative purposes.

Official College Statement

The impact of the computing facility on our college during the past two years has been significant. We have been teaching a course on FORTRAN during our regular as well as summer semesters. Because of the increasing awareness and participation in computing, both on the part of students and faculty, we felt the need to include more courses and languages in this area. Our Business Administration departments have a grant from Kellogg Foundation which includes participation in computer science. We have therefore revised our curriculum and introduced new courses in computer sciences. Recently PL/I has been made available on our IBM 1050 terminal. We plan to teach a course in PL/I starting shortly. Preparations are underway to teach COBOL during the fall semester of 1971 especially to our students in the School of Business. Several of our departments, the Department of Science and Mathematics and those of the Business School in particular, have revised their syllabi to include computer science courses in their curricula.

Presently the college is involved in its Self-Study Program and all our data are being analyzed on the computer. All of our questionnaires in this regard are computer oriented.

We also have an IBM 360/20 computer for administrative work. Recently students have started using it and learning RPG on their own with a little guidance from the personnel in the computer science area. They also use it to list their classroom programs before submitting them to the terminal for processing. This helps them to correct some obvious errors.

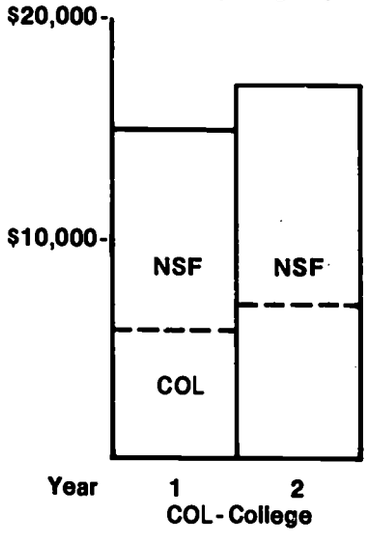
In response to the general interest in computing and to provide for small scale computation needs, our Science and Mathematics Department purchased a desk computer, Programma 101. We have introduced two courses in our computer science program based on Programma 101. To further stimulate student interest and provide incentive, our Science and Mathematics Department is in the process of purchasing some equipment to teach computer logic. In fact, the appreciation of our college community for computers has gone so far that we are investigating the possibility of replacing the IBM 1050 terminal and IBM 360/20 computer by a small computer the size of the IBM 1130 or NCR Century 100.

Besides the faculty and students who are involved in actual programming, our computing facility is also used by the general student body. Students, especially those in mathematics, run programs involving small computations on the IBM 1050 terminal. They receive help from the computer science instructor.

Thus, the last two years have brought significant changes in our college programs and have generated enthusiasm among our students so that many now plan careers in this modern and exciting field.

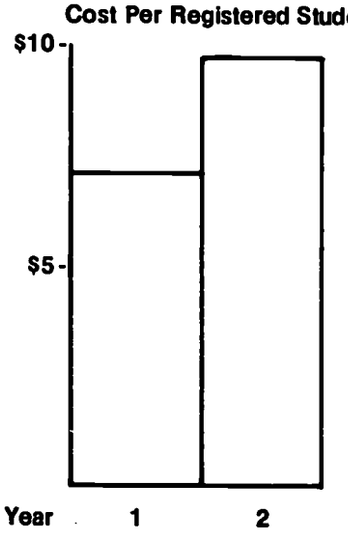
J. H. White
President

Total Computing Expenditures

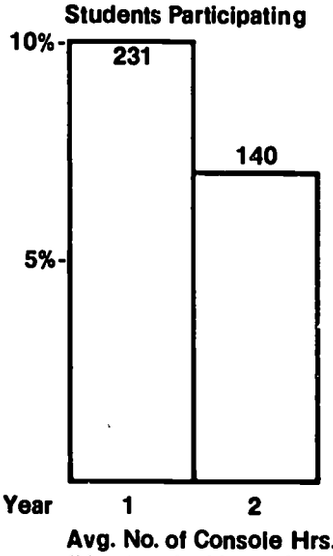


COL - College

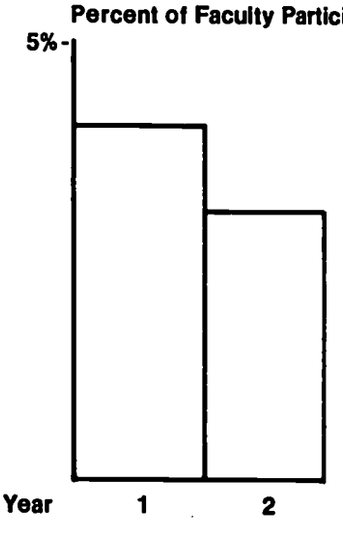
Cost Per Registered Student



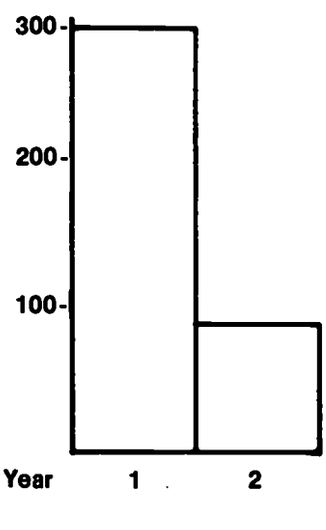
Students Participating



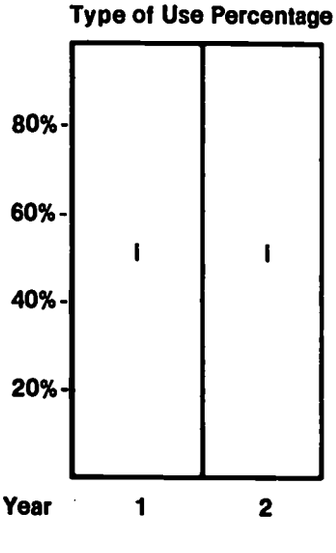
Percent of Faculty Participating



Avg. No. of Console Hrs. Per Month (Hrs. terminal in use) for Instruction and Research



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

Murray State College of Agriculture and Applied Science

Financial Support:

State Appropriations	67%
Student Fees	27%
Public Grants	5%
Private Grants	1%

Enrollment: (Fall 1969) 757

Fulltime	93%
Undergraduate	100%
Men	74%

Degrees: Associate - (1967-68)

Science	33
Other	127

Term: Two semesters plus summer session.

Faculty: Fulltime 38

Earned Doctorate	3%

Computing Facilities Prior to Project:

None

Computing Facilities at Start of Project:

Equipment

- IBM 1050 Terminal to the University of Oklahoma
- 059 Verifier
- Cardpunch (1)

Space - 121 sq. ft.

Personnel - (in FTE's)

Center Director	.33
Other Professional	.00
Other Staff	.00

Expenditures - (1969-70) $11,654

Type of Use Percentage - (1969-70)

Instructional	100%
Research	0%
Administrative	0%

Located in Tishomingo, Oklahoma, Murray State College is a public, co-educational junior college under the control of the Board of Regents for Oklahoma Agricultural and Mechanical College.

The college currently occupies a 30 acre campus at the edge of the community in addition to operating a farm.

Its existence dates from a 1908 legislative act which provided for "the establishment and maintenance of agricultural schools of secondary grade in each supreme court judicial district, with branch agricultural experiment stations and short courses in connection therewith." By the 1923-24 academic year two years of college work had been added to the curriculum with the high school not being completely phased out until 1943. The present name was acquired in 1967.

Academic accreditation has been extended by the North Central Association of Colleges and Secondary Schools and all Oklahoma State School Accrediting Agencies.

Students may earn the Associate in Science Degree in agriculture, agriculture education, art, business administration, business education, chemistry, drafting and design technology, elementary teaching, engineering, forestry, general education, history, home economics, industrial arts, journalism, mathematics, music, nursing, physical education and coaching, predentistry, prelaw, premedicine, preoptometry, prepharmacy, preveterinary medicine, science, secretarial administration, or wildlife management.

Ninety-six percent of the students come from communities within Oklahoma and one percent from foreign countries. The typical student needed approximately $800 for tuition, fees, room and board for the 1969-70 academic year.

Prior to the experiment there were no computing facilities on campus. The terminal was installed during the latter part of May, 1969, and was used some from then through the first part of June for faculty instruction.

1969-70

The only change in operations during the first year was the moving of the terminal to a room across the hall to provide better access and to facilitate the installation of some data processing (unit record) equipment which is independent of this project.

The major problems centered around the lack of use of the facilities. Staff of the Computer Center of the University of Oklahoma held classes in terminal operation and programming for the faculty shortly after the terminal was installed, late in May, 1969. During the summer most of the faculty were gone, and during the school year their teaching loads were heavy. Early in the year RAX was available but only from 3-5 p.m. and a list of available programs was never provided. Late in the fall of 1969, RAX became available only on an appointment basis, and with a one-day advance notice. Once the IBM 360/50 was installed the only service provided was Coursewriter which was of little use to Murray State College.

The absence of on-campus programming assistance and of programming classes for students also contributed to the lack of terminal use. Programming was not taught because no instructor was available and because state regulations require new courses to be approved one year in advance of their being offered.

1970-71

The terminal was used instructionally in a physics class and by a biology instructor to analyze research data.

A major change was made from the IBM 1050 connected to the IBM 360/50 at the University of Oklahoma to an IBM 2741 connected to the IBM 360/65 at Oklahoma State University. This change was necessitated by the problems encountered during 1969-70.

Again, the faculty used the facilities very little, and, again, no programming instructor was available.

THE FUTURE

The current plans are to continue with the present facilities, staff, and budget.

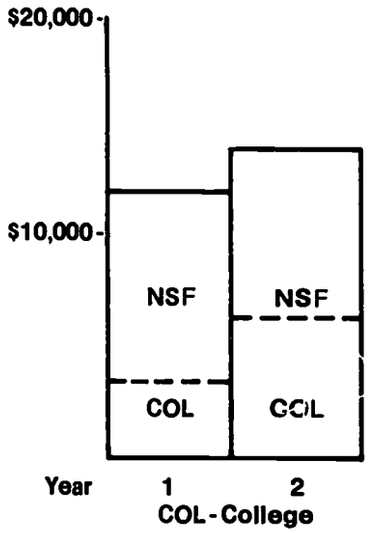
Official College Statement

Although very gradually, the main impact has been faculty acceptance of the computer as an instructional device. The hesitancy to change has illustrated quite vividly the extent to which traditional teaching methods are difficult to overcome.

It is my opinion that the pioneering experience will continue to have an influential impact for many years as resources become available to expand the use of the computer as an instrument of teaching.

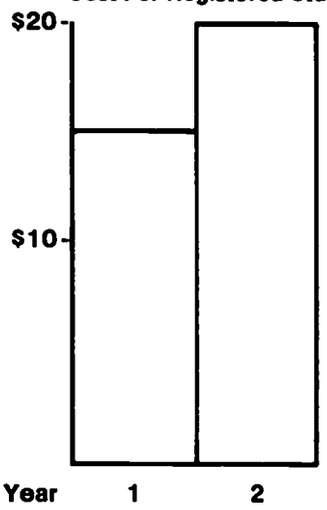
Clyde R. Kindell
President

Total Computing Expenditures

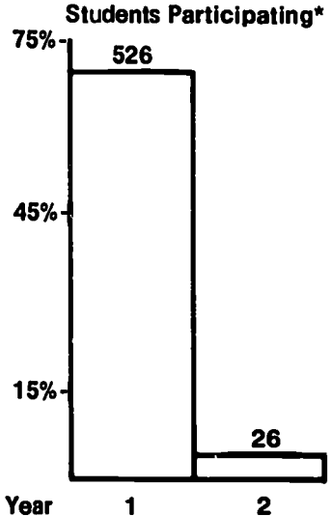


COL - College

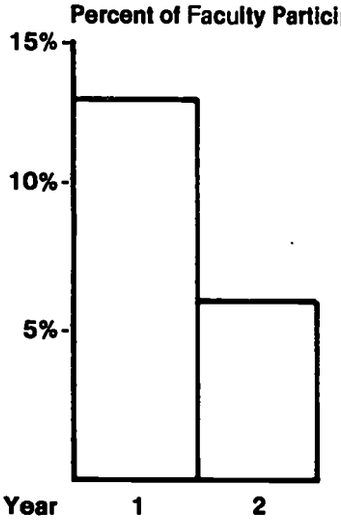
Cost Per Registered Student



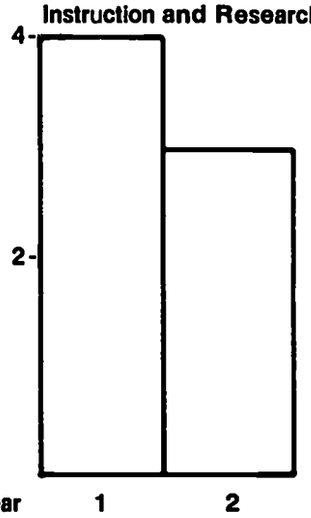
Students Participating*



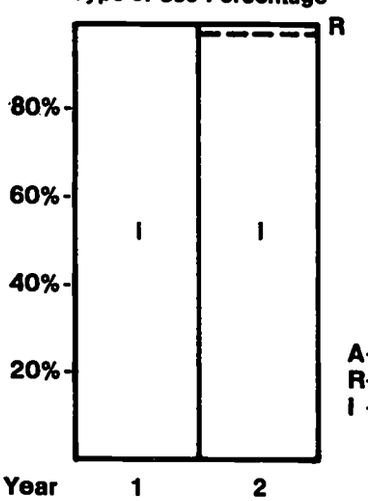
Percent of Faculty Participating



Avg. No. of Console Hrs. Per Month (Hrs. terminal in use) for Instruction and Research



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

*During the first year every freshman received a very light exposure to the facilities.

Huston-Tillotson College

Financial Support:	
Student Fees	51%
Private Grants and Appropriations	29%
Public Grants	20%
Enrollment: (Fall 1969)	631
Fulltime	98%
Undergraduate	100%
Men	48%
Degrees: Bachelor (1967-68)	
Science	33
Other	57
Term: Two semesters plus summer session	
Faculty: Fulltime	49
Earned Doctorate	30%
Computing Facilities Prior to Project:	
None	
Computing Facilities at Start of Project:	
Equipment	
Two ASR-33 teletypes to the University of Texas	
Space - 75 sq. ft.	
Personnel - (in FTE's)	
Center Director	.10
Other Professional	.25
Other Staff	.00
Expenditures - (1969-70)	$5,716
Type of Use Percentage - (1969-70)	
Instructional	100%
Research	0%
Administrative	0%

Located in Austin, Texas, Huston-Tillotson College is a private, co-educational liberal arts college affiliated with the United Methodist-United Church of Christ.

The college currently occupies a 23 acre campus in a residential area of the city.

It is the product of a merger of Tillotson College and Samuel Huston College. The former institution was founded in Austin in the year 1875. It was first recognized by the state of Texas as a junior college and for a nine year period beginning in 1926 it was a women's college.

Samuel Huston College was organized in 1876 in Dallas as Andrews Normal. In 1890 it moved to Austin. The merger of the two institutions was consumated in 1952 after a number of years of consideration.

Academic accreditation has been extended by the Southern Association of Colleges and Schools, The Texas Education Agency of the State of Texas, and the National Committee on Accrediting.

Students may earn either the B.A. or B.S., with majors in biology, business administration, chemistry, communication, health and physical education, history, home and family relations, mathematics, medical technology, philosophy and religion, physics, sociology, and teacher education.

Eighty-four percent of the students come from Texas and about three percent from foreign countries. The typical student needed approximately $2100 for tuition, fees, room and board for the 1969-70 academic year (two semesters).

Prior to July 1, 1969, there were no computing facilities on campus.

1969-70

No major changes or additions in operations were made during the first year. The year was started, however, with two terminals rather than the proposed one.

The major operational problem was related to the delay in terminal installation until after the start of classes.

1970-71

Use of the terminal facilities was exclusively related to the programming courses. These two courses, in a two-semester sequence, changed this year both in name and emphasis. They changed from Data Processing to Computer Programming and went from the Department of Business to Mathematics.

The only change involved a change in the instructor for the courses over the previous year.

The major operational problems centered around three areas. By way of hardware problems the central computer was often down and one of the terminals frequently needed repair. The absence of a suitable laboratory assistant also caused problems. Access to the terminals after 5:00 p.m. was difficult since they operated through the college switchboard. This was made necessary due to unauthorized long distance calls when direct lines were used.

The Future

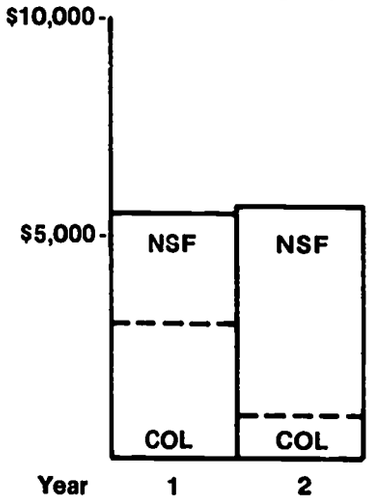
During the 1971-72 year operations will remain the same utilizing unexpended NSF funds. The budget will be equal to the remaining grant funds. Plans have been made to expand the usage to other disciplines.

Official College Statement

The computing facilities on our campus have made the entire college community aware of the powerful instrument for problem solving, computation and research. Some of our teachers have taken short courses in the use of the computer, and the entire faculty have attended a lecture on the computer and its uses. I cannot say how many students have come to this college because of the availability of computer courses, but I am sure that our enrollment has increased somewhat because of the computer.

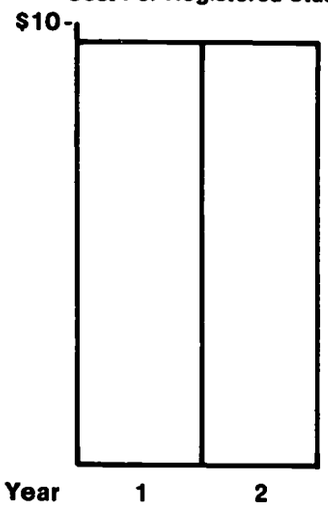
Exalton A. Delco, Jr.
Academic Dean

Total Computing Expenditures

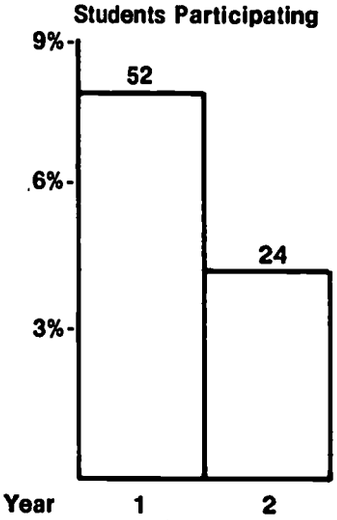


COL - College

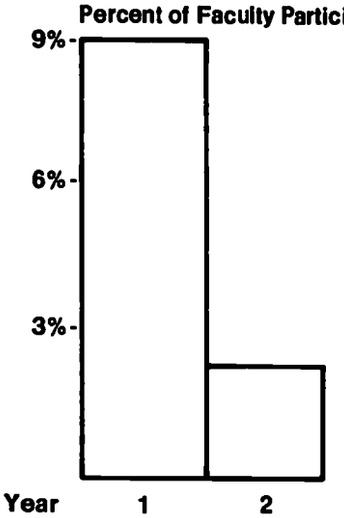
Cost Per Registered Student



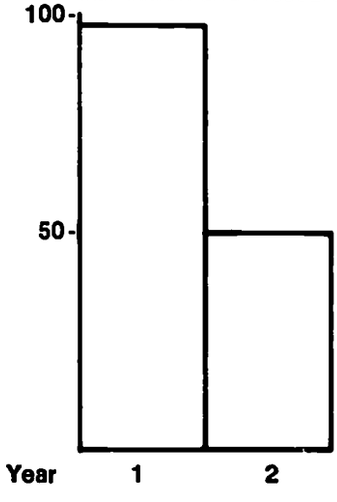
Students Participating



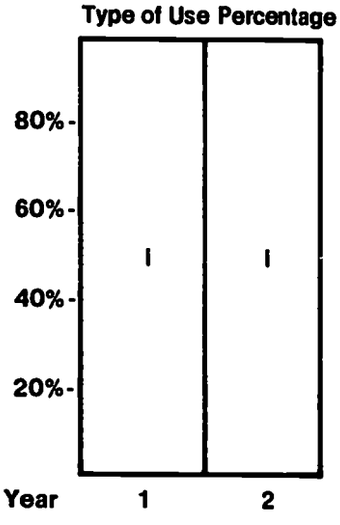
Percent of Faculty Participating



Avg. No. of Console Hrs. Per Month (Hrs. terminal in use) for Instruction and Research



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

Queens College

Financial Support:	
Student Fees	82%
Private Appropriations	15%
Public Grants	3%
Enrollment: (Fall 1969)	707
Fulltime	98%
Undergraduate	100%
Women	100%
Degrees: Bachelor (1967-68)	
Science	82
Other	93
Term: Two semesters	
Faculty: Fulltime	68
Earned Doctorate	42%
Computing Facilities Prior to Project:	
ASR-33 teletype connected to Triangle Universities Computation Center during 1968-69	
Computing Facilities at Start of Project:	
Equipment	
ASR-33 Teletype IBM 1050 Terminal Both connected to Triangle University Computation Center	
Space - 400 sq. ft.	
Personnel - (in FTE's)	
Center Director	.38
Other Professional	.00
Other Staff	.00
Expenditures - (1969-70)	$17,450
Type of Use Percentage - (1969-70)	
Instructional	80%
Research	17%
Administrative	3%

Located in Charlotte, North Carolina, Queens College is a private, liberal arts women's institution associated with the North and South Carolina Synods of the Presbyterian Church. It is under the control of the Board of Trustees.

Currently occupying a 50 acre campus in a residential area of the city, the college was first chartered in 1773 as Queens Museum (present name since 1912).

Because of its sympathy for the colonial cause it later became known as Liberty Hall Academy. In 1896 it became affiliated with the Presbyterian Church and in 1930 it merged with Chicora College of Columbia, South Carolina. Since that time, the school has been connected with both the North and South Carolina Synods of the Presbyterian Church.

Academic accreditation has been extended by the Southern Association of Colleges and Schools and the National Association of Schools of Music.

Students may earn the B.A. or B.M. in majors such as applied music, art, biochemistry, biology, chemistry, economics, French, German, history, Latin-American studies, literature, mathematics, music, music education, philosophy, physics, piano pedagogy, political science, psychology, religion, Russian studies, sociology, and Spanish.

Twenty-two percent of the students come from communities within North Carolina and less than one percent from foreign countries.

The typical student needed approximately $2900 for tuition, fees, room and board for the 1969-70 academic year (two semesters).

Prior to July 1, 1969, Queens had an ASR-33 teletype connected to the Triangle Universities Computation Center. This terminal operated during the 1968-69 academic year as part of the North Carolina Computer Orientation Project. Close to 40 students in chemistry and mathematics used the facilities for programming experience. Faculty seminars were held and some re-

search in psychology and literature was also assisted with the terminal.

1969-70

Two temporary additions were made, the first being in November. At this time another ASR-33 terminal was added for a six-week period due to a heavy student use. In April a CP/301 Plotter was brought in for a one-month period to provide some additional experience.

Operational problems were in two areas—hardware and personnel. It took several weeks to get the 1050 terminal working reasonably well. It was never clear whether the problem was in the terminal itself, data set, or in the communication lines. In addition, it took several months to get the AUTOCALL operating.

The terminal facility has been staffed with part-time student assistants which has caused problems, especially when trying to assign responsibilities.

1970-71

The terminal facilities were used instructionally in a number of courses. The chief use in economics courses was in simulation such as financial management. In sociology and biology use was made of several statistical routines. One programming course was taught, Mathematics 100, Introduction to Programming.

The major change in operations occured when the principal investigator took a leave of absence and was replaced for this year. A significant number of new programs were made available on the system by the North Carolina Educational Computer Service. An additional part-time staff member was hired to assist in the operation of the center. The new staff member is referred to as a para-professional having an associate degree.

Problems were mostly centered around the facilities themselves. Slow turn-around and down-time related to the supplier were occasional sources of difficulties. In addition the slow speed of the terminals mitigated against the use of problems with large amounts of input and/or output. Queing problems were also frequently encountered due to having only one card punch and one papertape punch. Limited finances caused a shortage of assistants to staff the center at all times.

The Future

Operation of the terminal facility next year will be essentially the same as at present, although a little diminished due to a 17 percent budget cut when the grant monies expire. This will be noticed most in the number of student assistants hired. The teletype may also be switched to a commercial vendor of time-sharing services to secure a lower rate. The only other change will be the return of the original principal investigator from his leave of absence.

Official College Statement

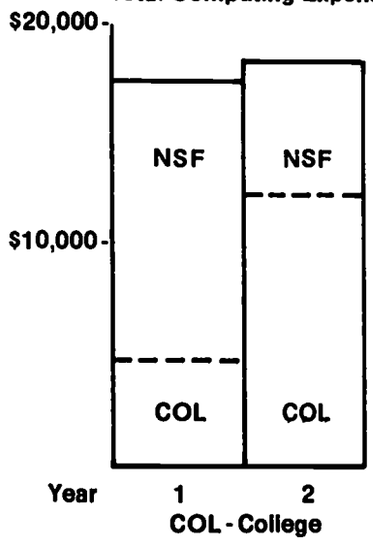
The presence of computer facilities at Queens College has had a significant impact upon the educational program during the past two years, particularly for mathematics, natural sciences, and social sciences. With two terminals, our faculty and students have been introduced to the opportunities available through a large computer facility. Some have taken computer programming for use on their academic projects as well as for jobs after graduation. The faculty has a heightened level of awareness about the use of computers, not merely for the solution of mathematical problems, but also in the humanities. One professor has done a computer study of a classical manuscript in an effort to determine authorship.

In addition, the presence on campus of these facilities has created a positive atmosphere, for it is another visible sign of our effort to provide an outstanding program for young women.

It has given our representatives, Dr. Ben Fusaro and Dr. Frank DeFelice, an opportunity to contact other interested persons in different institutions.

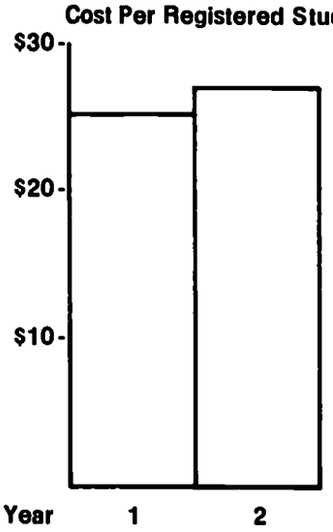
John E. Smylie
President

Total Computing Expenditures

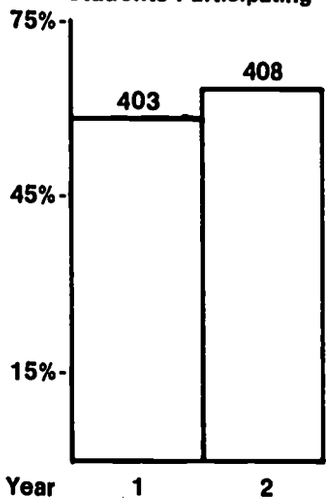


COL - College

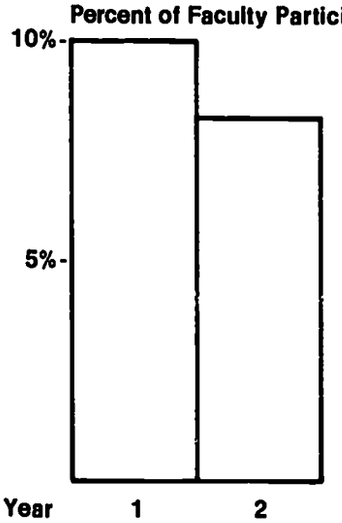
Cost Per Registered Student



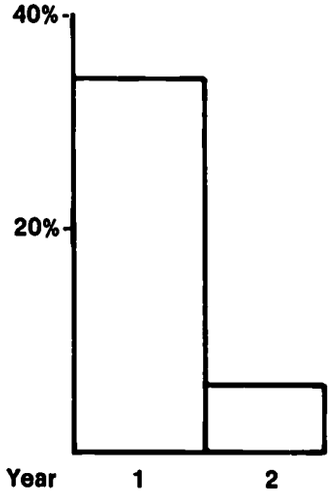
Students Participating



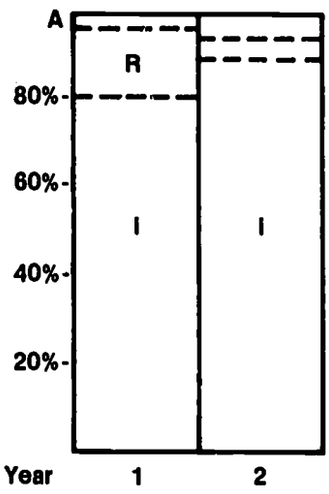
Percent of Faculty Participating



Avg. No. of Console Hrs. Per Month (Hrs. terminal in use) for Instruction and Research



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

George Peabody College for Teachers

Financial Support:
- Student Fees 57%
- Public Grants 38%
- Private Grants 5%

Enrollment: (Fall 1968) 1775
- Fulltime 79%
- Undergraduate 59%
- Men 33%

Degrees: (1966-67)
- Science
  - Bachelor 55
  - Master 144
  - Specialist 3
  - Doctorate 6
  - TOTAL 208
- Other
  - Bachelor 198
  - Master 152
  - Specialist 30
  - Doctorate 32
  - TOTAL 412

Term: Two semesters plus summer session

Faculty: Fulltime 128
- Earned Doctorate 56%

Computing Facilities at Start of Project:
- Some use of computer at Vanderbilt University for research by graduate students and faculty

Computing Facilities During Project:
- Equipment
  - IBM 1130 8K — Disk 1024K
  - 340 1/m Printer — Card Punches (2)
  - 514 Reproducer
  - Storage Access Channell II
- Space - 1200 sq. ft.
- Personnel - (in FTE's)
  - Center Director ..... .50
  - Other Professional ..... .50
  - Other Staff 2.00
- Expenditures - (1968-69) $54,504
- Type of Use Percentage - (1968-69)
  - Instructional 50%
  - Research 50%
  - Administrative 0%

Located in Nashville, Tennessee, Peabody College is a private, co-educational teacher-training institution at both the undergraduate and graduate levels. It is under the control of the Board of Trustees of the college.

Currently occupying a 75 acre campus in a residential area of the city, the college's existence dates back to 1785 and the founding of Davidson Academy.

Peabody College took upon itself the major role of preparing teachers after the Civil War. Its development was accelerated by generous financial support of the Peabody Fund from 1875 to 1904.

Academic accreditation has been extended by the Southern Association of Colleges and Schools, the National Council for Accreditation of Teacher Education, the American Library Association, and the National Association of Schools of Music.

Students may earn degrees from the B.A. and B.S. up through the Ph.D. Undergraduates may major in art,

biology, business education, chemistry, elementary education, physics, geography, history, home economics, mathematics, modern languages, music, physical education, psychology, or special education.

Sixty-five percent of the students come from communities within Tennessee and two percent from foreign countries. The typical undergraduate needed approximately $1800 for tuition, fees, room and board for the 1968-69 academic year (two semesters).

Prior to July 1, 1968, there existed only a unit record equipment operation under the direction of the Business Office and staffed by a director and a machine operator. Education 297, Automatic Data Processing in Education, utilized this center some, but its major role was for administrative purposes.

Other activities, such as faculty research, Psychology 211-Computer Applications, and class scheduling by the Division of Surveys and Field Services, requiring computers utilized off-campus facilities at Vanderbilt University.

1968-69

Fifteen formal courses, both undergraduate and graduate, utilized the computer facilities in varying degrees of involvement. Two psychology courses were heavily programming oriented and the other thirteen were taught by the Departments of Education, Library Science, Mathematics, Psychology, and Sociology. Numerous non-credit seminars for faculty and students were also offered during the first year.

The majority of students using Peabody's Computer Center are graduate students. As a result, about one-half of the computer activities are related to research efforts.

Major changes in equipment and operation included the addition of three card punches to bring the total to five. The decision was also made not to shift to a data communications terminal with the XDS Sigma 7 at Vanderbilt University as anticipated.

The major operational problem during the first year centered around the monitor. The applications packages which were "sold" with the system would only work on Version I and Peabody's 1130 had Version II. In addition, the processing of student programs was hindered by an insufficient number of card punches.

1969-70

During this second year, a third disk drive was added due to the increased storage requirement caused by the presence of extensive disk-resident software. The Storage Access Channell II was removed due to a lack of use and three additional card punches were added to reduce the card preparation delays.

The operational problems were minor and took the form of some "bugs" in a few applications packages.

1970-71

The computing facilities continued to influence curriculum development. In particular, new workshop-format courses emphasizing computing in educational administration, statistical analysis, and the secondary school were developed and approved by appropriate campus committees. Also, the 1971-72 college catalogue was revised to include a special listing of computer-related courses available on campus.

The only major change was the reduction of "work study" student personnel, a reduction occasioned by a cut in funds for student support.

Expanding use of the computer for alumni office mailings created some scheduling problems during the year; however, users seem to have taken these developments in stride.

The Future

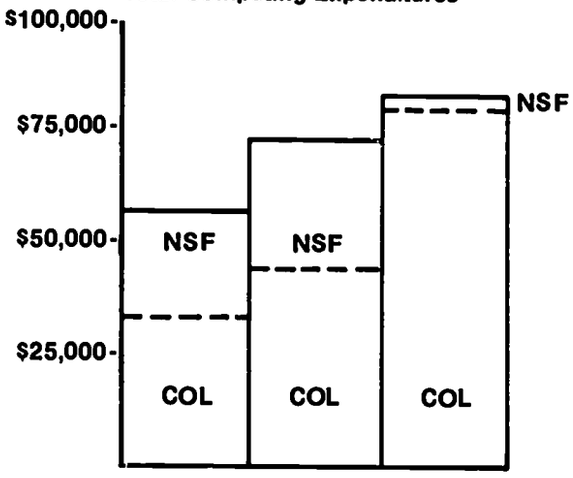
The operation of the computer center will continue through next year with no anticipated changes in hardware, personnel, space, or budget. Increased utilization of the system is anticipated especially in research management and instruction.

Official College Statement

Our computing facilities continue to be used extensively for instructional purposes. Some departments which used the facility during the fall semester did not offer computer-based courses in the spring term, but they have definite plans to offer these courses again in the fall and tentative plans to extend the usage into the spring semester, 1972. Professors report that student interest is high. At any rate, the overall picture of usage for the school year 1970-71 remains essentially the same as last year.

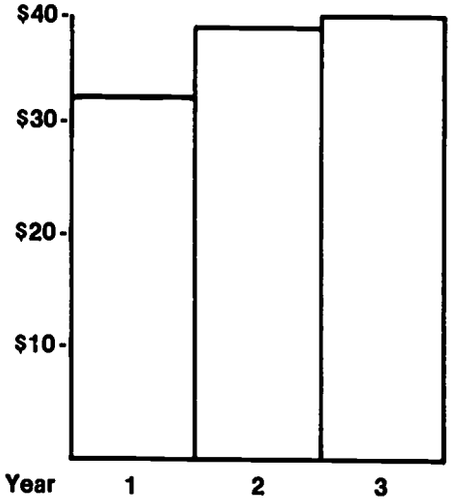
Mitchum E. Warren, Jr.
Chairman, Undergraduate Instruction
Committee

Total Computing Expenditures

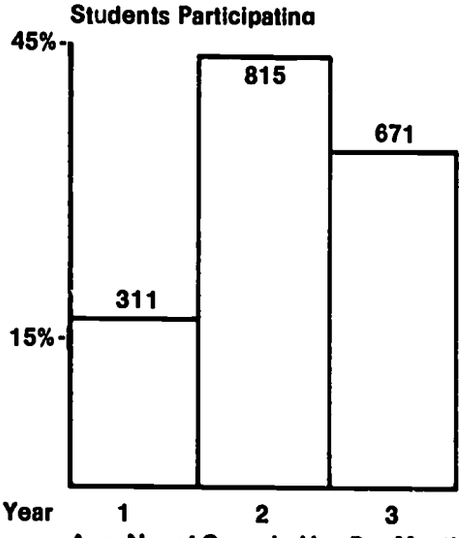


COL - College

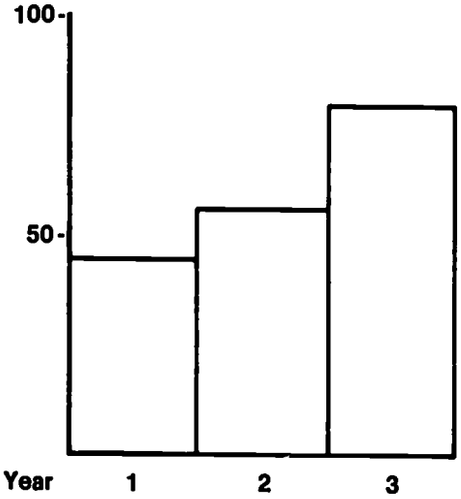
Cost Per Registered Student



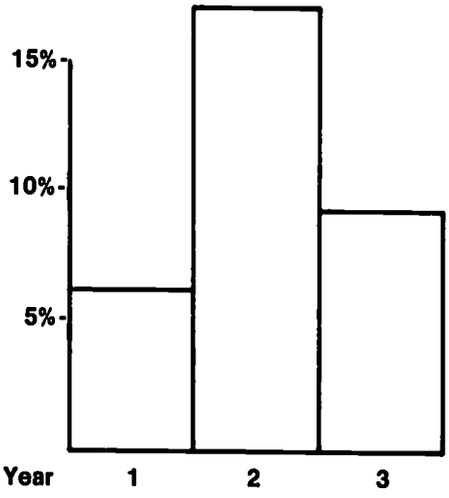
Students Participating



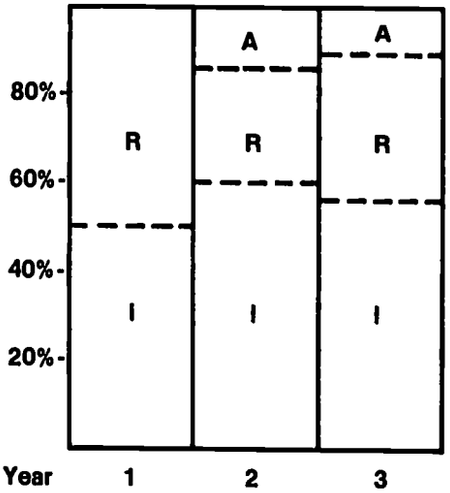
Avg. No. of Console Hrs. Per Month (Hrs. computer in use) for Instruction and Research



Percent of Faculty Participating



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

Xavier University of Louisiana

Financial Support:

Student Fees	40%
Private Appropriations	15%
Public Grants	29%
Private Grants	16%

Enrollment: (Fall 1968) 1335

Fulltime	88%
Undergraduate	94%
Men	41%

Degrees: (1966-67)

Science	
Bachelor	41
Master	7
TOTAL	48
Other	
Bachelor	73
Master	6
TOTAL	79

Term: Two semesters plus summer session

Faculty: Fulltime 85
Earned Doctorate 19%

Computing Facilities Prior to Project:
None

Computing Facilities at Start of Project:
Equipment

IBM 1130 8K	Card Punch (1)
082 Sorter	548 Interpreter
085 Collator	

Space - 1536 sq. ft.
Personnel - (in FTE's)

Center Director	1.00
Other Professional	.50
Other Staff	2.00

Expenditures - (1968-69) $69,551
Type of Use Percentage - (1968-69)

Instructional	43%
Research	7%
Administrative	50%

Located in New Orleans, Louisiana, Xavier University is a private, co-educational liberal arts institution at both the undergraduate and graduate levels. It is Catholic Church related.

Currently occupying a 23 acre campus in a residential/commercial area of the city, the college's existence dates from the opening of a high school in 1915. That secondary school was the result of the Sisters of the Blessed Sacrement going to the city to "undertake the education of the colored Catholic youth of New Orleans."

Two years later a Normal Department was added and in 1925 a further expansion established a Teacher's College and a College of Liberal Arts. Still later came the College of Pharmacy and the Graduate School.

Academic accreditation has been extended by the Southern Association of Colleges and Schools, the State of Louisiana Department of Education, and the American Council on Pharmaceutical Education.

Students may earn the B.A., B.S., and M.A. degrees in areas such as accounting, art, art education, biology, business administration, business education, chemistry, early childhood education, economics, education, elementary education, English, French, history, language education, marketing, mathematics, mathematics education, music therapy, pharmacy, physical education, physics, preengineering, premedicine, prepharmacy, political science, Russian, science education, social studies education, sociology, Spanish, speech arts,

speech education, and speech pathology.

Seventy-five percent of the students come from communities within Louisiana and two percent from foreign countries. The typical undergraduate needed approximately $1500 for tuition, fees, room and board for the 1968-69 academic year (two semesters).

Prior to July 1, 1968, there were no actual computing activities on campus. In October, 1967, a Director of Data Processing was appointed to assess Xavier's computing needs and make recommendations accordingly.

1968-69

Four computer programming courses were taught by three different departments in addition to Introduction to Data Processing by the Department of Business Administration and Education. Further, numerous seminars and demonstrations were conducted for faculty and students.

No major changes in equipment or operations were made during the initial year.

Major first year operational problems were of two types: educating users and software. Vigorous efforts by the computer center staff to get faculty and students to use the facilities did not provide sufficient momentum for the majority. The beginner needs more assistance than a new center can provide. Simple problems, such as checking out the scientific subroutines, became major issues for a first year center with insufficient support by the manufacturer.

1969-70

The programming classes grew in enrollment but not spectacularly. These courses did become two and three hour courses from the original one hour. A short course in APL generated some enthusiasm among faculty and selected students but little follow-through resulted. This was probably due to the unusual difficulty encountered when working with APL via an 1130 console. Departments using the computer in their courses during the second year were Business Administration, Chemistry, Economics, and, to a lesser degree, Mathematics. Lecture-demonstrations were also given to groups from education and sociology. Some of the faculty members who had made plans for using the facilities during this year did not return to the institution or assumed other responsibilities. Also during this year Computer Science was named a "developing" department with a small library budget. Its goal is to support the other disciplines rather than to specialize.

The most significant change was started when the Academic Council voted to move from its previously inflexible core curriculum (heavily loaded with 20 credits required in philosophy and theology) to a core curriculum which not only included 8 hours of free electives but also named computer sciences as one of the new categories. This was to become effective in September 1970. In addition, three hours of computer science would now be required of majors in mathematics, preengineering, mathematics education, physics, and chemistry at the first semester freshman level and premed at the second semester sophomore level. Other departments would strongly recommend it as an elective, (Pharmacy did so in the bulletin). Business Administration and Economics would at least continue to offer a three-semester sequence for their purposes.

The only equipment changes involved the addition of two more card punches which made a total of four. The collator was also removed.

A major problem centered around trying to increase faculty and student response to and use of the computer. This problem should be alleviated with the implementation of the new core curriculum mentioned earlier. Personnel problems centered around too inexperienced a staff, too short a supply of adequately trained student assistants, and too many different responsibilities for the key staff.

Some indirect problems were created by the initiation of a five-year planning cycle, the turmoil associated with the core curriculum changes, student unrest, and the trauma of administrators whose time-honored ways of doing things were changed by the use of the computer systems.

1970-71

Instructional uses varied considerably, ranging from demonstrations for kindergarten children to programming classes. Students from seventeen different courses utilized the facilities in one or more ways. In some cases the programs were written by the instructors or were part of packages; however, in most courses the students did some programming themselves. Most of the use came from the sciences or mathematics, but one music composition class did use the 1130 for some compositions of all melodies.

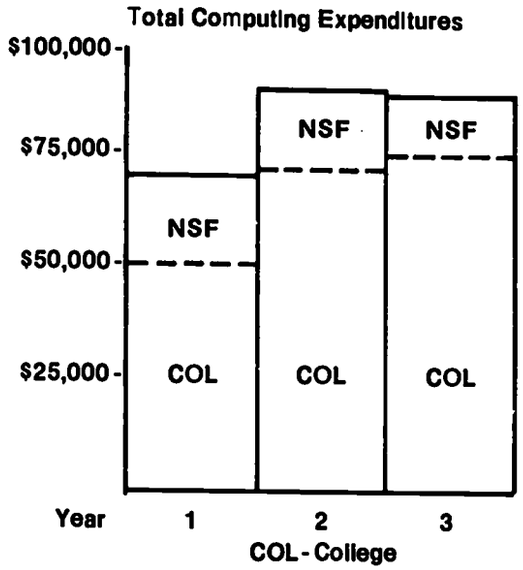
During this year two more card punches were added, one for peak administrative loads and student use and the other for the chemistry students. The 1130 COBOL compiler was also added.

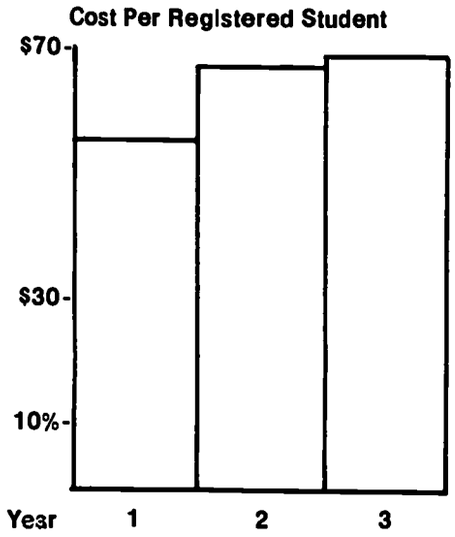
One multi-responsibility staff position (for administrative data processing) was eliminated but replaced by two separate positions. In addition three student workers were added. The physical facilities were expanded slightly and rearranged to improve traffic flow and to create a student lab area.

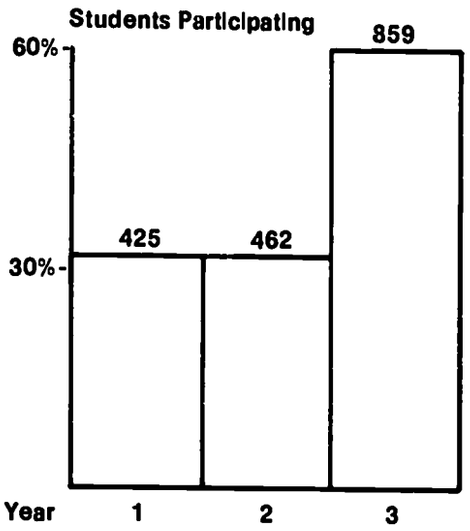
The major problems encountered during the 1970-71 academic year center in three areas: hardware, staff, and facilities. Throughput is now being held down by the slow speed of the printer, and the existing staff are very overworked due to the increased use of the computer system. The still inadequate facilities and staff prohibit the separation of the academic and administrative functions, cause the noise and temperature levels to remain too high, and do not permit the center to remain open regularly late at night.

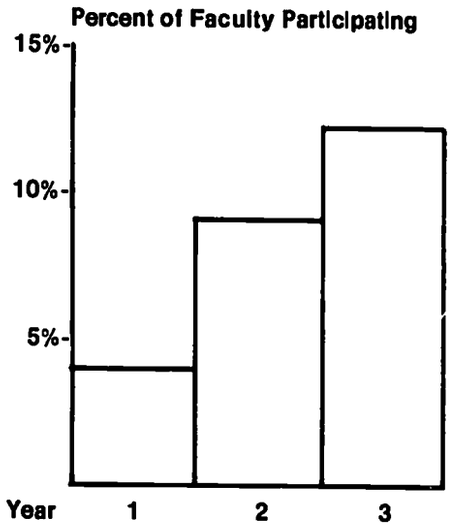
The Future

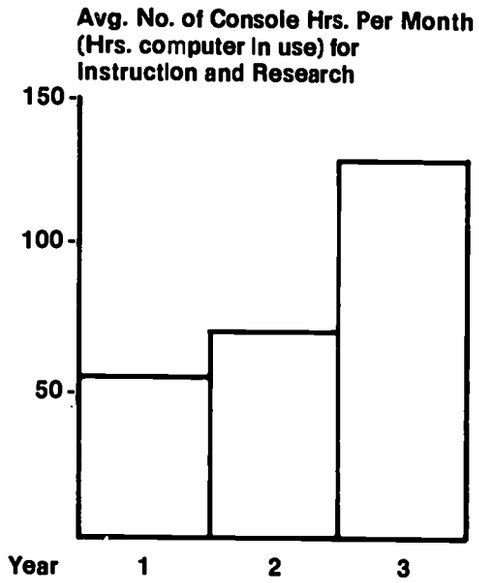
Usage will continue to increase. To alleviate the resulting problems, an IBM 129 Cardpungh-Verifier will

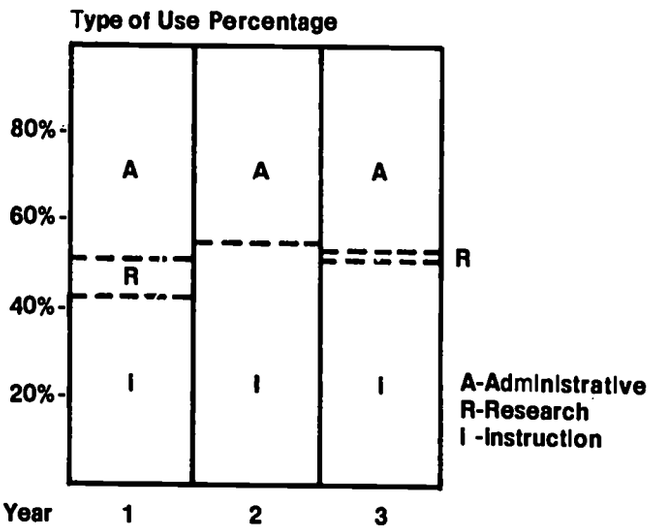

Total Computing Expenditures
$100,000
$75,000
$50,000
$25,000
NSF
NSF
NSF
COL
COL
COL
Year
1
2
3
COL - College


Cost Per Registered Student
$70
$30
10%
Year
1
2
3


Students Participating
60%
30%
425
462
859
Year
1
2
3


Percent of Faculty Participating
15%
10%
5%
Year
1
2
3


Avg. No. of Console Hrs. Per Month
(Hrs. computer in use) for
Instruction and Research
150
100
50
Year
1
2
3


Type of Use Percentage
80%
60%
40%
20%
A
A
A
R
R
I
I
I
A-Administrative
R-Research
I -Instruction
Year
1
2
3

be added and several other changes are proposed. They include the addition of a one-spindle disk drive and a 1403 printer (340 1/m), a staff consultant to assist in the social and behavioral sciences, a budget increase to $73,810, and the addition of 960 sq. ft. of floor space for the center.

Official College Statement

The computer has had noticeable impact on the Xavier campus during the short period since its advent.

Students are discovering that they can now add another dimension to study in their majors; some are changing into fields in which they can get maximum exposure to computer experience.

Some professors are planning the reorganization of entire courses to take advantage of the presence of a computer on campus.

Department chairmen have reorganized curricula to include, in some instances, a requirement for freshmen in computer science and, in others, strong recommendations to students to take programming before a certain level. One department has organized a sequence of courses involving the computer.

Two chemistry professors are involving undergraduate students in research which would be impossible without the computer.

Administrators have discovered that work can be done efficiently on the computer, and some are motivated to approach the computer as a desirable component in new systems.

At Xavier the computer has changed more than the curricula, administrative systems, and people; it has changed the budget. Although the strain is severely felt, the benefits show sufficient hope to encourage us to explore new and efficient operating procedures which would permit us to continue forging ahead. Xavier has invested critical resources and personnel to make computer services a reality. We believe that the total benefits of our investments are still in the future. Therefore, it would be difficult to think of the future without a computer on the Xavier campus.

Norman C. Francis
President

Centenary College of Louisiana

Financial Support:
- Student Fees 45%
- Endowment 35%
- Private Grants 18%
- Public Grants 2%

Enrollment: (Fall 1968) 1310
- Fulltime 87%
- Undergraduate 100%
- Men 54%

Degrees: Bachelor (1967-68)
- Science 23
- Other 156

Term: Two semesters plus summer session

Faculty: Fulltime 75
- Earned Doctorate 50%

Computing Facilities Prior to Project: None

Computing Facilities at Start of Project:
- Equipment
  - IBM 1130 8K Disk 512K
  - 80 1/m Printer Card Punches (2)
  - 082 Sorter 548 Interpreter
  - Storage Access Channell II
- Space - 500 sq. ft.
- Personnel - (in FTE's)
  - Center Director ..... .25
  - Other Professional 1.25
  - Other Staff 1.00
- Expenditures - (1968-69) $46,869
- Type of Use Percentage - (1968-69)
  - Instructional 67%
  - Research 0%
  - Administrative 33%

Located in Shreveport, Louisiana, Centenary College is a private, co-educational liberal arts institution. It is affiliated with the United Methodist Church.

Currently occupying a 40 acre campus in a residential area of the city, the college is the oldest institution of higher education in the state. It was founded in 1825 in Jackson, Louisiana, and graduated its first class in 1827.

During the Civial War, classes were suspended because most of the students and faculty were in military service. In 1909 the college moved to its present location.

Academic accreditation has been extended by the Southern Association of Colleges and Schools, the National Association of Schools of Music, and the American and the General Board of Education of the United Methodist Church.

Students may earn the B.A., B.S., or B.M. degree. The majors are art, biology, business, chemistry, drama, economics, education, engineering, English, French and Spanish, geology, German and Spanish, government, history, humanities, Latin, Latin and Spanish, mathematics, medical technology, music education, natural sciences, philosophy, physical education, physics, piano, psychology, religion, social science, sociology, Spanish, speech, and speech education.

Fifty-nine percent of the students come from communities within Louisiana and one percent from foreign countries. The typical student needed approximately $1800 for tuition, fees, room and board for the 1968-69 academic year (two semesters).

There were no computing activities on campus prior to July 1, 1968.

1968-69

One new course, Computer Systems, was developed in the Mathematics Department because of the newly added computer facilities. Three non-credit programming courses were taught in addition. Nineteen other courses made formal use of the facility during this initial year.

Operational problems during the first year centered around the difficulties faced by new users including

staff, who had to be trained. Too much is required of the inexperienced individual before he can make effective use of a computer system, since he must learn FORTRAN and how to deal with the monitor. There is a lack of good applications packages for instructional purposes —especially outside the natural sciences. A number of science laboratories have modern electronic desk calculators; this makes it difficult to justify the effort involved in using the computer for small problems. An additional difficulty arose from the inability of the faculty to prepare adequately for computer usage; the equipment was not installed until August, at which time most faculty members had departed for the summer.

1969-70

Two major changes were made during this year. Increased use and the resultant delays in card preparation necessitated securing an additional card punch. In addition, a student operator was employed two nights per week for running administrative jobs to save the prime time for student use.

The problems of software bugs and restricted space continued from the initial year, as did those problems related to instructional use caused by inexperienced faculty.

1970-71

The computer has continued its penetration of the curriculum with two particularly significant developments. First, the explicit computer course has become a prerequisite for the Math Department's numerical analysis course. In addition the Physics Department has revised its curriculum to include a sophomore-level applied mathematics course, to be taught for the first time next year. This course will include a good deal of instruction in computing and will be a prerequisite for all upper-level physics courses, so that computer applications can be included in these courses as appropriate.

The staff situation this year was changed by the addition of a Data Processing Coordinator. This part-time employee is charged with liaison between the Computer Center and the administrative offices using the computing facilities. He has been most useful in clarifying procedures, scheduling work, and developing new applications. It should be made clear that this individual is **not** a programmer; his function is to work with the people involved. Except for this addition, the staff situation has remained unchanged.

The hardware situation has changed only in two ways: A Univac VIP keypunch/verifier/interpreter has replaced an IBM keypunch/interpreter and a verifier. The change reduced costs somewhat and has had most satisfactory results. The VIP is used almost entirely for administrative applications as it is far too sophisticated for casual use or use by the inexperienced. The second change was the addition of a CalComp 565 12" plotter. This device has been most useful in a number of applications, though its potential has not been fully realized as yet.

Some of the problems this year—indeed the major ones—and the plans for next year reflect the financial crisis faced by the college. This crisis has led to the declaration of a financial emergency by the Trustees of the College and to an announced intention to make a significant reduction in the size of the faculty. Such a situation is not conducive to the development of new computer applications. A computer installation is, of course, an expensive facility not viewed benignly by non-users. The facility itself is necessary and will continue; however, the financial situation is sufficiently severe that we have been forced to reduce staff by elimination of the programmer, effective at the end of the 1970-71 academic year.

The Future

Operations will essentially be the same in the immediate future except for increased use and the loss of the programmer.

Official College Statement

While the IBM 1130 has been on campus for only three years, it has had a significant effect in several important areas of activity of the college. It is only reasonable to expect its impact to increase with the passing of time.

The expansion of the computer into the classroom is occuring somewhat slowly but steadily. The faculty—including the managers of the computer—insist that classroom usage be manifestly relevant to the subject matter and involve problems of sufficient magnitude to warrant the use of this powerful device. Thus, while the computer has not found its way into every class, or even the majority of them, it has materially enriched a number of them.

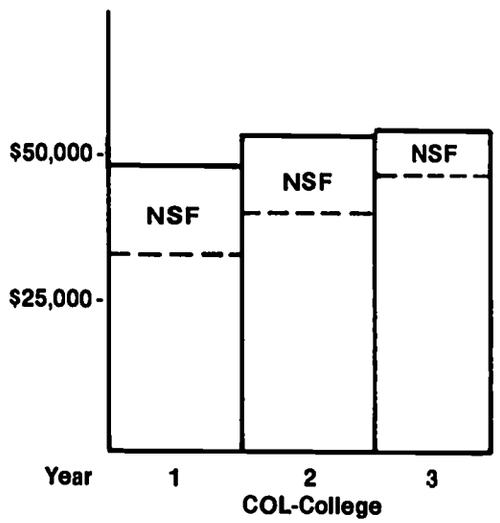
The computer is a valuable resource for individual projects of faculty and students. A number of students have used it for independent projects. It is most significant that several members of the faculty have used it to expand their professional activities and competence. We expect that the computer will assist us in attracting desirable faculty members and students in the future.

Administrative data processing, presently limited to current student enrollment information, has benefited us greatly by providing timely information needed by administrators, faculty advisors, and students. Throughout the development of this application, harmony has prevailed between computer management and administrators, an apparently unusual state of affairs. The success of this use of the computer has led to plans for increased automation of college record-keeping.

Lastly, we must acknowledge that the impact of a computer installation upon the budget is significant. The expense must be justified by service to the college in its entirety—including faculty, students and administrators. We believe we have made a good beginning in all these areas and that, with careful planning and development, the computer will become an important—if not indispensable—resource of the college.

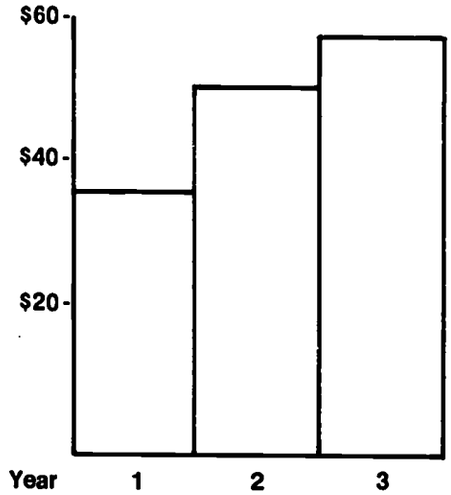
John H. Allen
President

Total Computing Expenditures

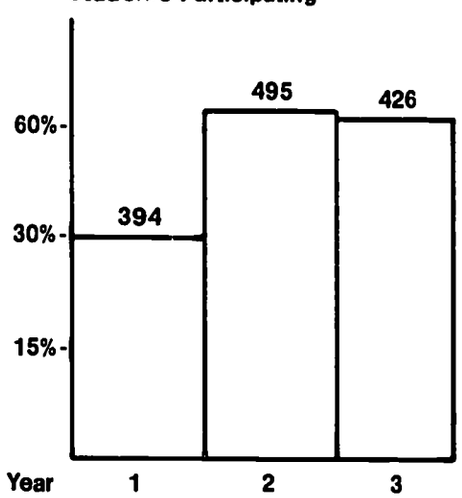


COL-College

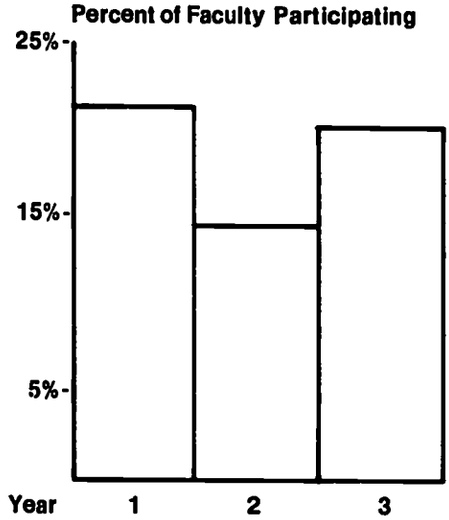
Cost Per Registered Student



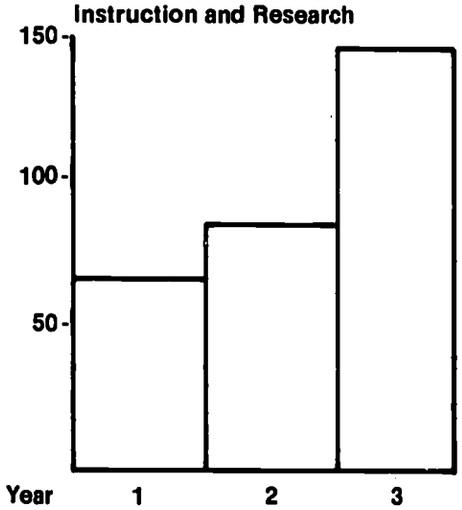
Students Participating



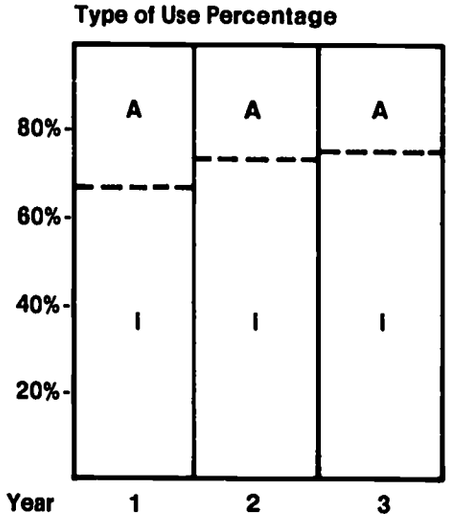
Percent of Faculty Participating



Avg. No. of Console Hrs. Per Month (Hrs. computer in use) for Instruction and Research



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

Eastern Mennonite College

Financial Support:

Student Fees	81%
Public Grants	12%
Private Appropriations	7%

Enrollment: (Fall 1968) 951

Fulltime	93%
Undergraduate	96%
Men	46%

Degrees: Bachelor (1966-67)

Science	49
Other	66

Term: Three quarters plus summer session

Faculty: Fulltime 55

Earned Doctorate	32%

Computing Facilities Prior to Project:

One card punch was used on campus in conjunction with a local service bureau for administrative work. A few students took a programming class at Bridgewater College each year.

Computing Facilities at Start of Project:

Equipment

IBM 1130 8K	Disk 512K
80 1/m Printer	Card Punches (3)
059 Verifier	082 Sorter

Space - 1600 sq. ft.

Personnel - (in FTE's)

Center Director	1.00
Other Professional	1.00
Other Staff	.25

Expenditures - (1968-69) $43,704

Type of Use Percentage - (1968-69)

Instructional	76%
Research	0%
Administrative	24%

Located in Harrisonburg, Virginia, Eastern Mennonite College is a private, co-educational institution. It also includes a graduate seminary and a high school, all of which are under the control of the Virginia Mennonite Conference.

Currently occupying a 100 acre campus at the edge of the city, the college had its beginning in the organization of a church school in 1913. An academy was begun in 1917, with the first college work offered a year later. Until 1947 the curriculum was primarily that of theology and religious education. It was in that year the Virginia Board of Education authorized the awarding of the B.A. and B.S. in education degrees.

Academic accreditation has been extended by the Southern Association of Colleges and Schools and the Virginia State Board of Education.

Students may earn the B.A., B.S., and B.D. degrees and major in Bible, biology, business, business administration, business education, chemistry, elementary education, English, foreign languages, history, home economics, mathematics, music, natural sciences, nursing, psychology, and sociology.

Thirty-seven percent of the students come from communities within Virginia and three percent from foreign countries. The typical undergraduate needed approximately $2000 for tuition, fees, room and board for the 1968-69 academic year (not including summer).

Prior to July 1, 1968, the Business Office had a computerized system utilizing a card punch, sorter, verifier, and a local service bureau. Some record keeping also utilized this system. Two faculty members had utilized off-campus computers in their research projects and a small number of students enrolled in a computer programming course at Bridgewater College each year.

1968-69

Several courses were offered which were directly related to computers. The three college level credit courses, Introduction to Computer Science Programming, Control Systems and Data Processing, and Business Policy and Management, enrolled a total of 45 students. Another 100 students took a non-credit short course in programming and 25 students took Computer Programming offered in high school.

The only major change in equipment and operations was the addition of one card punch to bring the total to four.

The major operational problems in the first year centered around the fact that the computer was not delivered until November and some difficulty was had in obtaining the correct power connector. The manufacturer also supplied a faulty compiler which prohibited the loading of monitor up-dates. In addition, the processing of student programs was greatly delayed due to an insufficient number of card punches.

1969-70

The one change in equipment was the ordering of another card punch which brought the total to five.

What operational problems there were centered around the hardware and software. The printer and console typewriter both needed repairs and the RPG compiler needed attention.

1970-71

The use of the computer for instructional purposes continued to increase. At the undergraduate college level, students in eight different courses used the facilities as part of their learning experiences. Five of the courses were in science and mathematics, while one each was in business, sociology, and English.

The major operational change made over the previous year was that the college assumed all of the financial support. This also included a small budget increase.

The Future

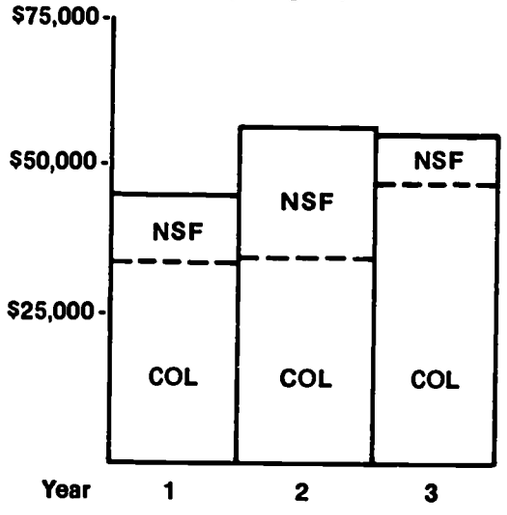
Operations will basically remain the same with a slight budget increase anticipated. Instructional and administrative use will increase, necessitating more efficient control of unnecessary runs.

Official College Statement

The computer added something to the atmosphere and efficiency of campus life. There is a noticeable pride among students that their own small college can boast an "on the grounds" computer with its attendant opportunities and conveniences. The number of students participating in computer instruction programs is substantially on the increase. The computing center has greatly enhanced the processing of student records in the Registrar's Office and student accounts in the Business Office. We now have a complete financial program for the college. In the near future we will have a gift accounting program for our Development Office.

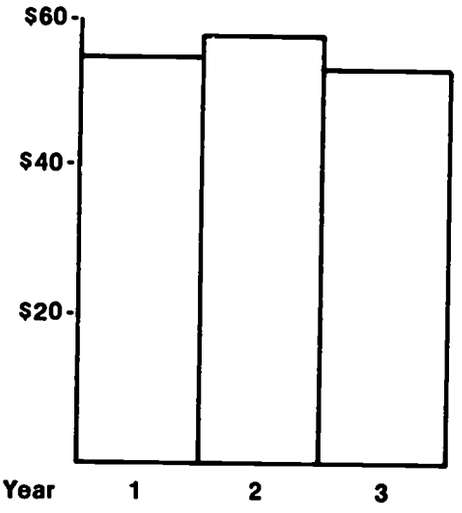
Myron S. Augsburger
President

Total Computing Expenditures

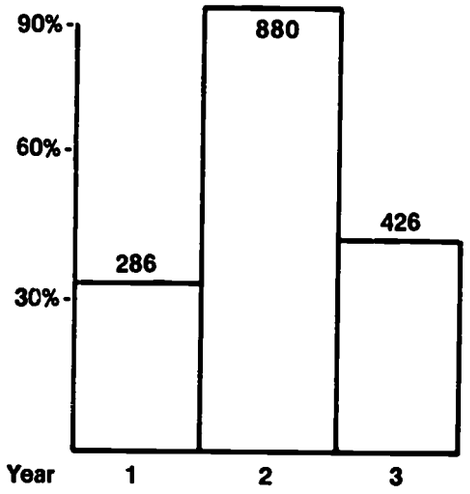


COL - College

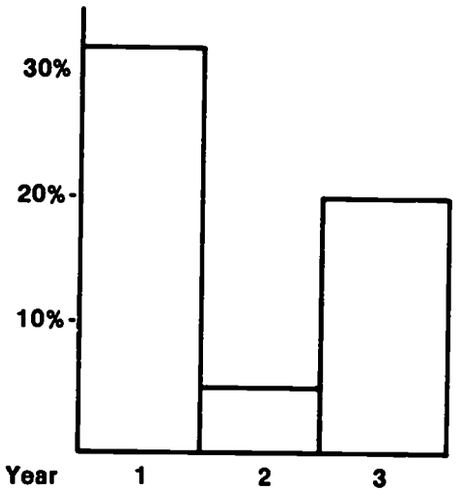
Cost Per Registered Student



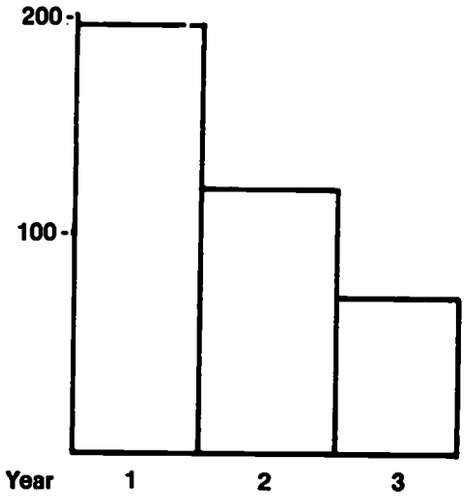
Students Participating*



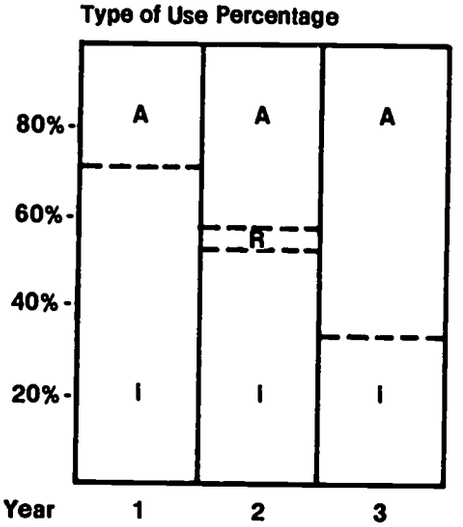
Percent of Faculty Participating



Avg. No. of Console Hrs. Per Month (Hrs. computer in use) for Instruction and Research



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

*During the second year large numbers of students received a minimal exposure to the computer.

Fairmont State College

Financial Support:
- Student Fees 25%
- State Appropriations 69%
- Public Grants 6%

Enrollment: (Fall 1968) 2968
- Fulltime 94%
- Undergraduate 100%
- Men 53%

Degrees: Bachelor (1966-67)
- Science 89
- Other 192

Term: Two semesters plus summer session.

Faculty: Fulltime 158
- Earned Doctorate 18%

Computing Facilities Prior to Project:
1966-67 West Virginia University's facilities used for one programming course with physical transportation of programs.
1967-68 IBM 1050 to IBM 1050 at West Virginia University for student programs to be run on IBM 7040.

Computing Facilities at Start of Project:
Equipment

IBM 1130 8K	Disk 512K
80 1/m Printer	Card punches (3)
056 Verifier	082 Sorter
085 Collator	548 Interpreter

Space - 850 sq. ft.
Personnel - (in FTE's)
- Center Director 1.00
- Other Professional 1.75
- Other Staff 2.00

Expenditures - (1968-69) $72,502
Type of Use Percentage - (1968-69)
- Instructional 60%
- Research 0%
- Administrative 40%

Located in Fairmont, West Virginia, Fairmont State College is a state supported, co-educational institution to provide general and vocational education at the college level. It is under the control of the West Virginia State Board of Regents.

Currently occupying an 80 acre campus in a residential area of the city, the college's existence dates from 1865.

Fairmont began as a private teacher-training school, but became a state supported normal school within two years. It is currently the oldest existing normal school south of the Mason-Dixon Line and the earliest recipient of aid from the George Peabody Fund. Its first bachelor's degree in education was awarded in 1924, followed by the B.A. and B.S. degrees in 1943.

Academic accreditation has been extended by the North Central Association of Colleges and Secondary Schools and the National Council for Accreditation of Teacher Education.

Students may earn either the B.S. or A.B. degree and major in commerce, drama, education, fine arts, industrial-technical education, language, literature, mathematics, nursing, physical education, science, social science, and speech.

Ninety-two percent of the students come from communities within West Virginia. The typical student needed approximately $1100 for tuition, fees, and room and board for the 1968-69 academic year (two semesters).

Prior to July 1, 1968, the college had a unit record operation for administrative data processing and the

free use of the computer facilities of West Virginia University for instructional purposes. Up to the 1966-67 academic year very little use was made of those facilities; however, a Title III grant enabled the hiring of a programming instructor that year.

A Computer Survey and FORTRAN class was taught with student programs being physically transported to West Virginia University for processing.

The following year saw the leasing of an IBM 1050 terminal to West Virginia University. It was used as an off-line device for transmitting student and faculty programs.

1968-69

Instructional use included the teaching of three computer courses: FORTRAN Programming, COBOL Programming, and Introduction to Electronic Data Processing. At least one course in chemistry, mathematics, and electronic technology formally used the computer as part of the course. Numerous seminars for faculty and students were presented in computer application and programming. Some faculty research projects were also aided with the 1130 and some instructional tools such as business games were tried. As a public service, some student scheduling was processed for six area high schools.

There were several planning activities aimed toward utilization of the facilities. Included were two new economics courses using the computer as a tool, a summer training program for high school students, a two-year computer technology curriculum, and a possible communication link of the 1130 with the IBM 360/75 at West Virginia University.

Major changes in equipment and operations included the addition of 4 more card punches, the employment of two additional fulltime staff members (a programmer and an operator), decentralization of the card punches into specific departments and the library, and reorganization for permanent establishment of computer services.

Operational problems during the first year were complicated by the fact that the IBM 1130 was not delivered until October. Other related problems were caused by insufficient space for personnel and equipment and too few card punches initially.

Instructional use, in general, was hindered by a lack of technological ability on the part of the faculty which also decreased the interest in using the facilities to enhance instruction. Another hindrance was the absence of a COBOL compiler for the 1130 which required student programs written in that language to be taken to West Virginia University for processing.

Friction arose between the instructional and administrative staff due to an unexpected and unplanned for set of circumstances. When the computer first became operational it was run on an open-shop basis almost exclusively; therefore, machine use required little advanced scheduling or planning. As administrative use increased, the amount of open-shop time decreased and access conflicts resulted.

The Board of Regents placed a moratorium on increased computer activities while developing a long-range plan relative to such activities. This has retarded progress and inhibited inter-institutional sharing.

1969-70

A fulltime programmer was added to the staff to assist the faculty, especially those with little programming experience. Another change saw the addition of an ASR-33 terminal connected to the IBM 360/75 at West Virginia University to expand the instructional use of computers on this campus.

The major problem experienced during this year was the slow speed of the printer. Increased use also added to the number of conflicts in work scheduling, and the lack of a COBOL compiler continued to restrict some of the intended applications.

1970-71

A general increase in computer applications for instruction was experienced during the year. Regular use was made by the divisions of business, economics, chemistry, physics, technical education, education, psychology, and social science. The major new addition was computer-augmented accounting for principles of accounting classes.

An IBM 1403 printer was ordered to upgrade the system. Efforts continued to increase the library and to develop an internal information system. No changes were made in personnel or facilities.

The project encountered no significant problems except pressure from increased usage. This problem will be reduced by the faster printer.

The Future

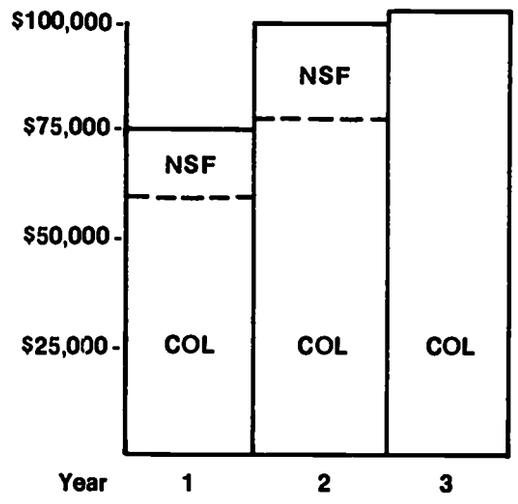
The Fairmont State Computer Center facility has come under a new state plan for computer services. This plan assures continued support and development of the facility. A communication adapter and transmission line will be added to permit the use of the IBM 1130 as an on-line terminal to the IBM 360/75 at West Virginia University in 1972. A second teletype terminal will be connected with the same computer in 1971.

The completion of a new science building in September 1971 will more than double the physical space for the Fairmont State College Computer Center, and the operation budget will increase to $100,000 by 1972.

Official College Statement

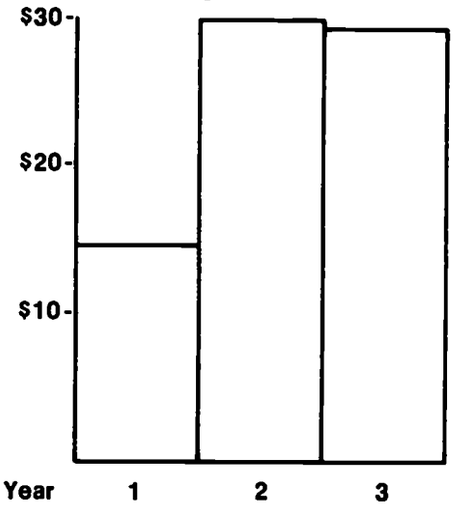
When the Computer Science Experiment was started on campus, though I was enthusiastic about it from the start, I must admit that I had some qualms about how the faculty would respond. Our experience in the Experiment, very soon after it got underway, has been just the opposite. There is no question in my mind but that the computer has had a significant impact on our instructional program. While all departments and divisions have used the computer in their instructional

Total Computing Expenditures

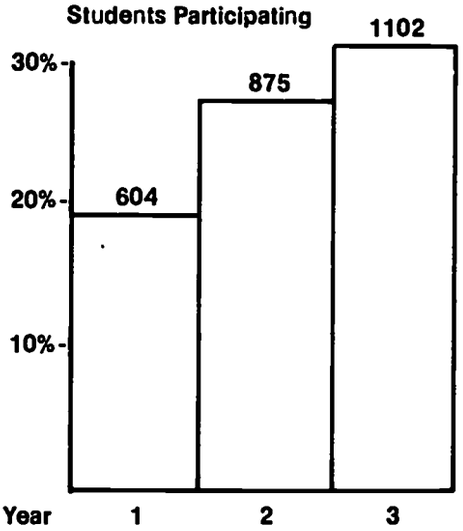


COL - College

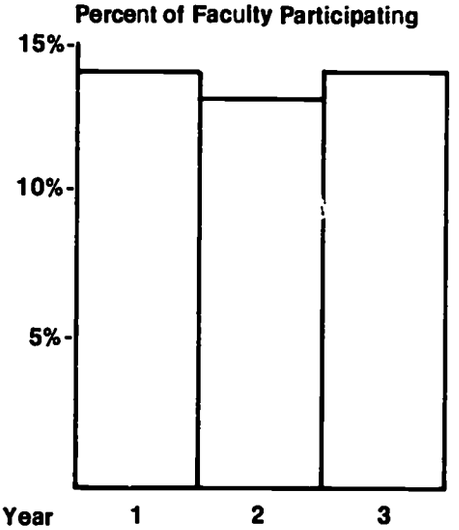
Cost Per Registered Student



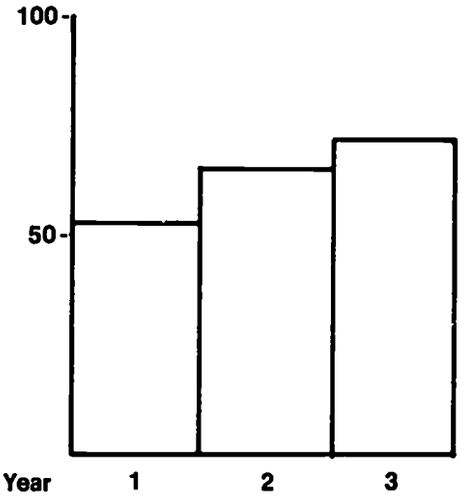
Students Participating



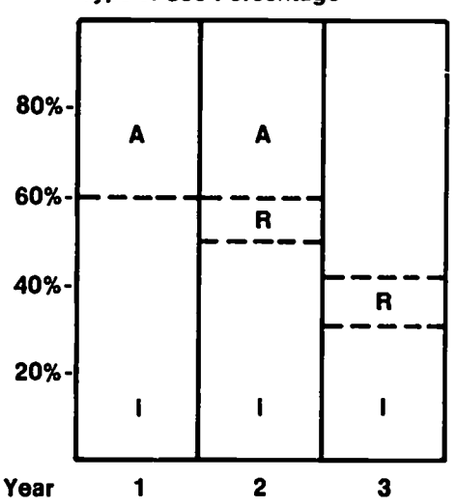
Percent of Faculty Participating



Avg. No. of Console Hrs. Per Month (Hrs. computer in use) for Instruction and Research



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

programs, the following disciplines have used it extensively: science, economics, technical education, mathematics, and psychology. I have been particularly pleased with the response of both faculty members and students. Even though the Experiment officially is about to end, the computer has become an integral part of our total educational program. We have definite plans not only to continue what we have been doing but to provide even more services when we are able to increase our financial support of this program. In fact, there is one thing about which I am certain—that is, because of the use that many of our faculty members are now making of the computer in their instructional program, we could not do without it even if we wanted to.

E.K. Feaster
President

Transylvania College

Financial Support:
- Student Fees 73%
- Private Gifts 20%
- Public Grants 5%
- Private Grants 2%

Enrollment: (Fall 1969) 878
- Fulltime 99%
- Undergraduate 100%
- Men 53%

Degrees: Bachelor (1967-68)
- Science 38
- Other 114

Term: Three quarters plus summer session

Faculty: Fulltime 63
- Earned Doctorate 50%

Computing Facilities Prior to Project:
Student programs were run at the University of Kentucky

Computing Facilities at Start of Project:
Equipment

IBM 1130 8K	Disk 512K
80 1/m Printer	Card Punches (3)
082 Sorter	059 Verifier

Space - 900 sq. ft.
Personnel - (in FTE's)
- Center Director ..... .50
- Other Professional 1.00
- Other Staff ..... .25

Expenditures - (1969-70) $44,681
Type of Use Percentage - (1969-70)
- Instructional 70%
- Research 0%
- Administrative 30%

Located in Lexington, Kentucky, Transylvania College is a private, co-educational liberal arts college related to the Christian Church. It is under the control of the Trustees of the college.

Currently occupying a 15 acre campus in a residential area of the city, the college was chartered by the Virginia Legislature. This event happened in 1780 when "Kentucke" was still a part of western Virginia.

In 1865, Kentucky University, a Disciples of Christ institution, moved to Lexington and the schools consolidated. Later an agriculture and mechanical college and a theological seminary were also opened.

In 1878 the agriculture and mechanical college withdrew to become a state institution, now known as the University of Kentucky. The seminary also separated and is now known as the Lexington Theological Seminary.

Academic accreditation has been extended by the Southern Association of Colleges and Schools.

Students may earn the A.B. in art, biology, chemistry, computer science, drama and speech, economics, elementary teaching, English, history, intercultural studies, language, mathematics, music, philosophy, physics, political science, preengineering, premedicine, pretheology, psychology, religion, secondary teaching, and sociology.

Forty percent of the students come from communities within Kentucky and three precent from foreign countries. The typical student needed approximately $2670 for tuition, fees, room and board for the 1969-70 academic year (two semesters).

Prior to July 1, 1969, there were two types of data processing activities. The Business Office utilized a unit record shop for administrative work and one computer programming course was being taught with the student programs processed at the University of Kentucky.

1969-70

During this year a part-time instructor was added to the staff for the purpose of teaching a course in the as-

sembly language of the hardware. The only other change was the addition of one card punch.

There were no real hardware or software problems during this initial year of operation. There was, however, a problem of being understaffed for the first five months.

1970-71

During this year 13 different courses used the computer with only three being in the area of computer science per se. Of the other ten, three were each in mathematics and economics, and one each in biology, chemistry, natural science, and social science. Some 60 students from two of the above courses diverted from the regular course curriculum for one week to learn to program using a specially developed compiler.

The most significant change was the development of a GO TRAN compiler for the 1130. The language (an adaption of 1620 GO TRAN) does not require format specifications when programming input and output and, therefore, students can write and run their own programs after only two hours of lecture. This activity was undertaken in line with the goal to teach all Transylvania students something about the computer before graduation.

Other changes involved moving into a newly remodeled and expanded (about twice the floor space) computer center along with the development of some general programs for questionnaire evaluation in the social sciences.

The only real problem is the increasing load on the system due to an increase in administrative use.

The Future

The major changes for the immediate future will be the addition of one fulltime key punch operator for administrative applications, the addition of another card punch (IBM 129), and an increase in the budget to cover these changes. Use of these facilities for both academic and administrative purposes will, of course, continue to increase.

Official College Statement

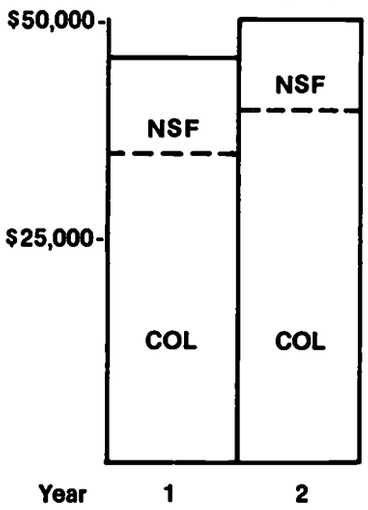
One focal point of our academic program has been the institution of our Computing Center under the direction of Dr. James E. Miller. The facilities have been in constant use, including late evening and night hours, primarily by the students and faculty. A concerted effort has been made to make considerable use of the facilities by our faculty in the area of social sciences, particularly economics. Class projects utilize many hours on the hardware while majors in our new computing science program have the opportunity to develop their skills.

The purchase of certain pieces and the rental of others have made a configuration of useable equipment. When the hardware is not in use by students, certain administrative tasks have been adopted for facilitation of records.

We take great pride in having our Center and feel that it is an educational plus in our academic program.

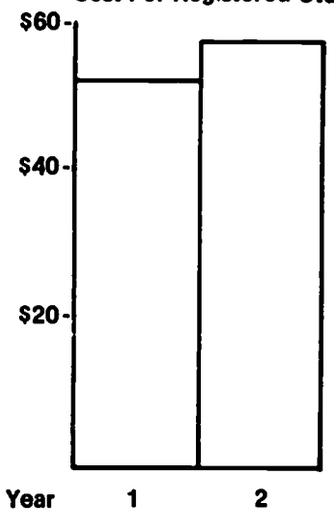
John R. Bryden
Provost

Total Computing Expenditures

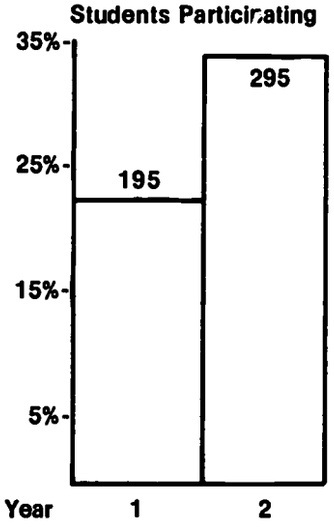


COL - College

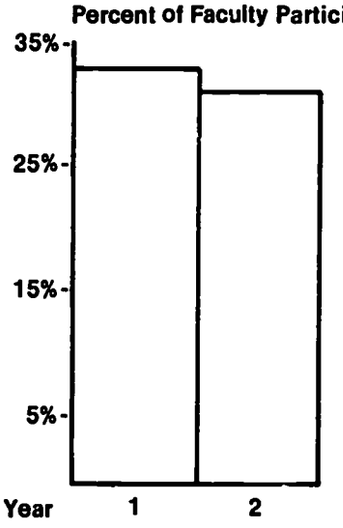
Cost Per Registered Student



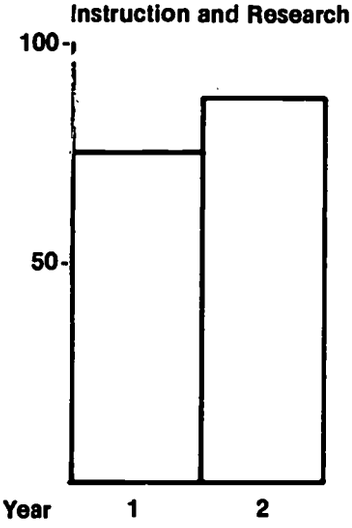
Students Participating



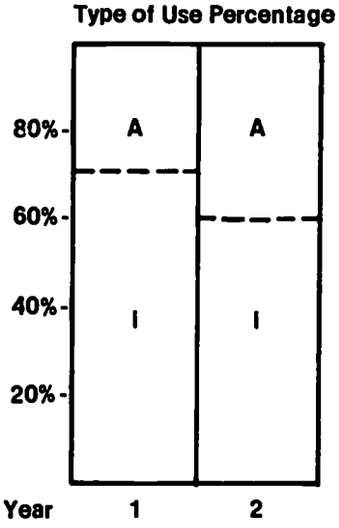
Percent of Faculty Participating



Avg. No. of Console Hrs. Per Month (Hrs. computer in use) for Instruction and Research



Type of Use Percentage



A-Administrative
R-Research
I -Instruction

Atlanta University

Financial Support:	
Private Grants and Gifts	58%
Public Grants	23%
Student Fees	16%
Other	2%
Enrollment: (Fall 1968)	1003
Fulltime	53%
Graduate	100%
Men	39%
Degrees: Master (1966-67)	
Science	53
Other	310
Term: Two semesters plus summer session	
Faculty: Fulltime	95
Earned Doctorate	61%
Computing Facilities:	
See Atlanta University Center Corporation	

Located in Atlanta, Georgia, Atlanta University is a private, co-educational graduate institution. It is under the control of its Board of Trustees.

Currently occupying a 43 acre campus in a residential neighborhood, Atlanta University was chartered in 1867. It began operations at the high school level and progressed upward, with its first normal class graduating in 1873, and its first college commencement in 1876.

During the 1928-29 academic year, no students below the college freshman or junior normal level were enrolled. It was during that same year that the plans were laid for Atlanta University to become a graduate institution eventually in cooperation with four undergraduate colleges, Clark, Morehouse, Morris Brown, and Spelman.

Academic accreditation has been extended by the Southern Association of Colleges and Schools.

Students may earn the following degrees: M.A., M.S., M.B.A., Ed.S., and Ph.D. The majors are biology, business administration, chemistry, economics, education, English, French, history, library science, mathematics, political science, social science, social work, and sociology.

Seventy-seven percent of the students are from Georgia and nine percent from foreign countries. The typical student needed approximately $1600 for tuition, fees, room and board for the 1968-69 academic year (two semesters).

Clark College

Financial Support:	
Student Fees	33%
Public Grants	31%
Private Grants	17%
Auxiliary Enterprises	13%
Student Aid	6%
Enrollment: (Fall 1968)	1007
Fulltime	98%
Undergraduate	100%
Men	33%
Degrees: Bachelor (1966-67)	
Science	35
Other	70
Term: Two semesters plus summer session	
Faculty: Fulltime	94
Earned Doctorate	26%
Computing Facilities:	
See Atlanta University Center Corporation	

Located in Atlanta, Georgia, Clark College is a private, co-educational, undergraduate institution under the control of its Board of Trustees.

Currently occupying a 14 acre campus in a residential neighborhood, Clark was one of the first institutions established after the Civil War by a religious denomination to provide Negroes in the South with formal education.

In its early years following its first class in 1869, the curriculum was vocational in emphasis and very basic. However, by 1883 Clark offered its first degree. The institution continued to grow in stature and was one of the first colleges to receive accreditation when the Southern Association of Colleges and Schools accepted institutions serving Negroes.

Students may earn the B.S. and B.A. degrees in art, biology, business administration, business education, chemistry, economics, elementary education, English, French, home economics, mathematics, medical technology, music, office administration, physics, psychology, religion and philosophy, social science, and Spanish.

Seventy-four percent of the students are from Georgia and less than one percent from foreign countries. The typical student needed approximately $2000 for tuition, fees, room and board for the 1968-69 academic year (two semesters).

Morehouse College

Financial Support:

Student Fees	27%
Private Grants	19%
Auxiliary Enterprises	18%
Sponsored Programs	16%
Appropriations	9%
Endowment Income	8%
Recovered Indirect Cost	4%

Enrollment (Fall 1968) 982

Fulltime	97%
Undergraduate	100%
Men	100%

Degrees: Bachelor (1966-67)

Science	74
Other	48

Term: Two semesters plus summer session

Faculty: Fulltime 79

Earned Doctorate	61%

Computing Facilities:
See Atlanta University Center Corporation

Located in Atlanta, Georgia, Morehouse College is a private, undergraduate institution for men.

Currently occupying a 25 acre campus in a residential neighborhood, it was organized by the American Baptist Home Mission Society of New York. In 1935 control was transferred to its Board of Trustees.

The college was organized in 1867 in Augusta, Georgia, but moved to Atlanta twelve years later. Morehouse occupied its present location in 1890 and received its current name in 1913.

Academic accreditation has been extended by the Southern Association of Colleges and Schools.

Students may earn the A.B. and B.S. degrees in art, biology, business administration, chemistry, economics, English, French, history, mathematics, music, philosophy and religion, physical education, political science, psychology, and sociology.

Fifty-six percent of the students are from Georgia and one percent from foreign countries. The typical student needed approximately $2300 for tuition, fees, room and board, for the 1968-69 academic year (two semesters).

Morris Brown College

Financial Support:	
Student Fees	70%
Public Grants	20%
Private Grants and Appropriations	10%
Enrollment: (Fall 1968)	1420
Fulltime	92%
Undergraduate	100%
Men	40%
Degrees: Bachelor (1966-67)	
Science	22
Other	97
Term: Two semesters plus summer session	
Faculty: Fulltime	92
Earned Doctorate	18%
Computing Facilities:	
See Atlanta University Center Corporation	

Located in Atlanta, Georgia, Morris Brown College is a private, co-educational, undergraduate institution. It is under the control of its Board of Trustees.

Currently occupying a 23 acre campus in a residential area of the city, Morris Brown was established by the African Methodist Episcopal Church in Georgia, with the first students being admitted in 1885.

In 1913 Morris Brown College and several other institutions merged into Morris Brown University. The original name was restored in 1929.

Academic accreditation has been extended by the Southern Association of Colleges and Schools.

Students may earn the B.A. and B.S. degrees in accounting, art, biology, business administration, chemistry, economics, education, English, food production management, French, health and physical education, history and political science, home economics, mathematics, music, philosophy, psychology, secretarial science, sociology, and Spanish.

Eighty-two percent of the students are from Georgia. The typical student needed approximately $1900 for tuition, fees, room and board, for the 1968-69 academic year (two semesters).

Financial Support:	
Student Fees	36%
Public Grants	26%
Private Grants	15%
Student Aid	23%
Enrollment: (Fall 1968)	978
Fulltime	99%
Undergraduate	100%
Women	100%
Degrees: Bachelor (1966-67)	
Science	61
Other	38
Term: Two semesters plus summer session	
Faculty: Fulltime	70
Earned Doctorate	35%
Computing Facilities:	
See Atlanta University Center Corporation	

Located in Atlanta, Georgia, Spelman College is a private, undergraduate institution for women. It is under the control of its Board of Trustees.

Currently occupying a 33 acre campus in a residential area of the city, Spelman College opened its first class in 1881, consisting of eleven pupils, mainly women out of slavery. It was the result of a work initiated by the Women's American Baptist Home Mission Society of New England.

The first college degrees were granted in 1901 and its present name was acquired in 1924. During the 1920's and 30's cooperative academic efforts were initiated with Morehouse College.

Academic accreditation has been extended by the Southern Association of Colleges and Schools.

Students may earn the B.A. and B.S. degrees in art, biology, chemistry, drama, economics, English, French, German, history, mathematics, music, political science, psychology, social science, sociology, and Spanish.

Fifty-one percent of the students are from Georgia, with an occasional student from a foreign country. The typical student needed approximately $1900 for tuition, fees, room and board for the 1968-69 academic year (two semesters).

Atlanta University Center Corporation

Computing Facilities Prior to Project:
Equipment - (Separate Administrative D.P. Center)
IBM 1401 12K, 2 Disk
Equipment - (Academic Use) - (1966-67)
ASR-33 to a commercial time-sharing service
Equipment - (Academic Use) - (1967-68)
IBM 1130 8K Disk 1024K
80 1/m Printer Card Punches (3)
Space - 800 sq. ft.

Computing Facilities at Start of Project:
Equipment - (Academic Use)
IBM 1130 16K Disk 1536K
340 1/m Printer Card Punches (5)
1232 Document Reader
Space - 800 sq. ft.
Personnel - (in FTE's)

Center Director	1.00
Other Professional	2.00
Other Staff	2.00
Expenditures - (1968-69)	$70,229
Type of Use Percentage - (1968-69)	
Instructional	90%
Research	10%
Administrative	0%

The Atlanta University Center Corporation is the administrative organization which facilitates interinstitutional cooperation among Atlanta University, Clark College, Morehouse College, Morris Brown College, Spelman College, and the Interdenominational Theological Center.

Students can readily take courses on the other campuses and in fact, some majors require courses taught only on given campuses.

The instructional computing facilities utilized as part of the project are separate from the administrative data processing center and are physically located on the campus of Morehouse College. Prior to July 1, 1968, instructional computing facilities had been available for approximately one year.

1968-69

During the first year in the project ten courses which were taught on several campuses used the computing facilities directly. They include such course titles as Introduction to Mathematics, Introduction to Computing, Introduction to Programming, Introduction to Statistics, Money and Banking, Numerical Analysis, Physical Chemistry, and Thesis Research.

One additional instructor and three additional student assistants were added to the staff. A change was also made from version one of the monitor to version two. Two more card punches were also added.

Two major operational problems during the initial year centered around the lack of sufficient space and monitor problems.

1969-70

The computer was used primarily for teaching computer programming and computer science courses.

The Computer Center lacked adequate floor space. The computer, director, instructors, and secretary are housed in a single classroom. Plans are being made to move to larger quarters.

1970-71

The primary use of the computer was still in conjunction with teaching programming and computer science courses.

A major improvement was made by moving to different and expanded quarters on the Morehouse campus. This move provided separate spaces for the computer, program preparation, and offices. Operations also changed from open shop to closed shop with one hour turn around time. This was done to relieve congestion in the computer room and to encourage students to study more carefully their programming errors.

The Future

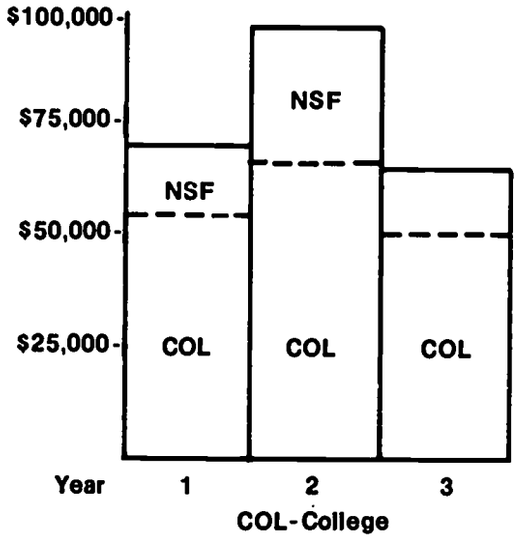
Operation of the computer will remain essentially the same, except that a combination of open and closed shop will be tried during the 1971-72 year.

Official College Statement

The computing facilities have provided an opportunity to add a new discipline to the curricula, Computer Science. Faculty members are beginning to use the computer to supplement their courses. Finally, students are graduating with some knowledge of the computer.

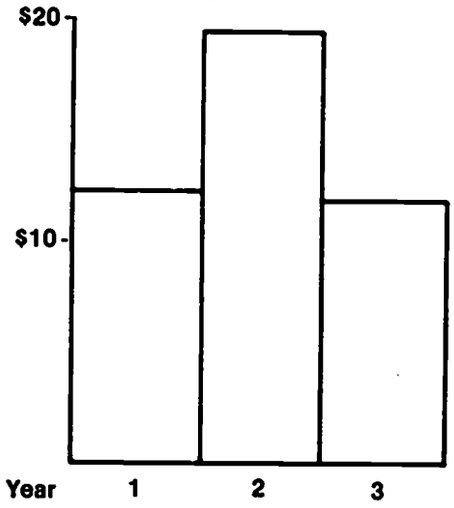
Grover Simmons
Director, Computer Center

Total Computing Expenditures

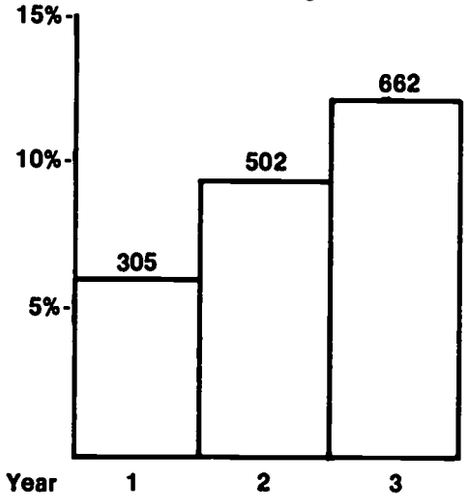


COL-College

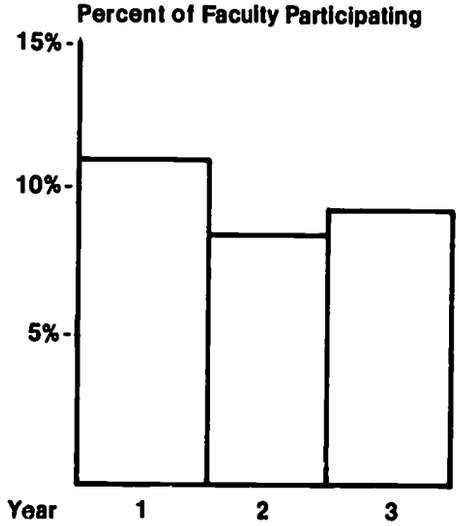
Cost Per Registered Student



Students Participating



Percent of Faculty Participating



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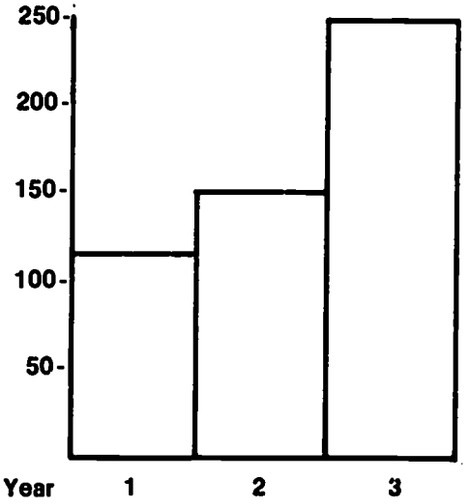
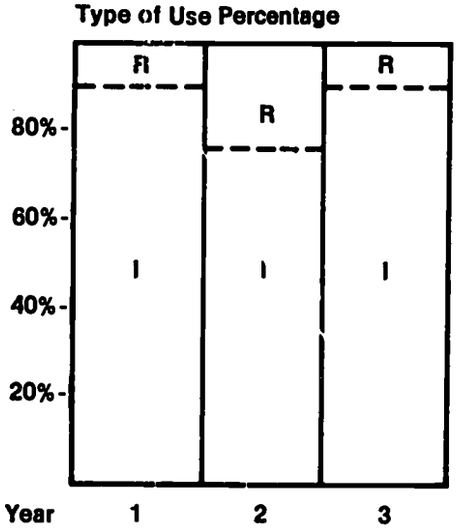


Type of Use Percentage



A-Administrative
R-Research
I -Instruction

Attitude Questionnaire | 8

Introduction:

The establishment of computing facilities for the 20 educational institutions involved in this experiment has had a decided effect on the respective campuses. The type and amount of effect is, of course, what this report is all about. Most of the evidence of change is presented as descriptions of activities with usage statistics.

It is generally recognized that innovative changes are frequently accompanied by, and may even interact with, changes in attitudes. Individual attitudes toward computers are often extreme and highly emotional.

An objective of the project from its conception was to determine what, if any, attitude changes toward computers had resulted among students, faculty, and administrators.

Procedure:

A five-point Likert-type questionnaire draft was developed by the project staff based upon a list of current attitudes towards computers, as identified by the staff and the Principal Investigators. A second draft was administered as a pilot test at the Atlanta University Center Corporation after which it was evaluated again.

From this came the final version consisting of eighteen attitude measuring items. The questionnaire also allowed for pertinent identification of each participant, e.g., student, faculty, administrator, class, major.

Because the objective of the questionnaire was to determine change, it was administered both before and after the project. Freshmen and juniors were pre-tested and subsequently post-tested as sophomores and seniors. At some colleges incoming freshmen were tested at the end of the experiment to determine to what extent change among participants in the experiment was a result of the experiment itself and not reflective of a more general cultural change.

The administration of the questionnaire was not without problems and was handled in a variety of methods among the various campuses. Two colleges (Huston-Tillotson and Xavier) are not included in the results here due to situations which were not condusive to dependable results. The data from the Atlanta University Center Corporation institutions were treated as one group.

Some of the institutions had a very good administration record in general, while at others it is highly suspect that the Principal Investigators took a rather disinterested attitude. It should be noted that local conditions sometimes predisposed this activity to some difficulties.

Results:

The reliability coefficients (measures of internal consistency for the questionnaire) ranged from .552 to .617. These values are quite similar to many of the attitude scales reported by Shaw and Wright in **Scales for the Measurement of Attitudes,** (McGraw-Hill, 1967).

There were no significant differences among administrators and only one among faculty. This one difference was negative but can be explained: the mean of the group was high to start with, and the remote computing service to the campus was reported as unsatisfactory during the first year.

Table 8.1 shows a total of nine significant t's among the student group at the class level. Table 8.2 shows eight significant differences by class and major.

The tables show rather clearly that the greatest number of significant changes occurred in the lower division and in the social sciences. There were no significant changes in attitude among the entering freshmen over the period of the project indicating that there was no general change contributing to those differences which were found to be significant.

Noteworthy is the fact that pre-experiment mean scores, especially of some academic majors, indicated positive attitudes to start with. For example, juniors majoring in the natural sciences started with a mean almost as high as that attained by sophomore natural science majors at the end of the experiment.

Conclusions:

The attitudes of students in general toward computers became more positive on some campuses, and most of all among the social science majors in their first two college years.

The following are suggested as possible factors behind the lack of more significant changes in attitude:

1. The small sample size in many cases.

2. The considerable decrease in participants from the pre- to the post-test situation.

3. The attitudes in general were somewhat positive prior to the arrival of the computing facilities.

4. The short duration of the project itself; many of those tested were not directly exposed to the computer between testings.

5. The attitudes of the Principal Investigators, administrators, and other leaders toward the facilities vary greatly and, quite naturally, set a climate of opinion.

Table 8.1

Significant Differences* Among Students by Class

College	Group: Sophomore - Freshman	Group: Senior - Junior	Total Number
Maryville	**4.108***		**1**
Wofford	**4.267**	**3.575**	**2**
Queens	**2.663**		**1**
Eastern Menn.	**2.661**	**3.163**	**2**
Fairmont	**6.007**	**2.632**	**2**
Transylvania	**3.129**		**1**
Total Number	**6**	**3**	**9**

*Expressed in t-values

Table 8.2

Significant Differences* Among Students by Class and Major

College	Group	Major: Soc. Sci.	Major: Nat. Sci.	Major: Humanities	Major: App. Arts	Total No.
Maryville	**Soph.-Fresh.**	**4.065***				**1**
	Sr.-Jr.					**0**
Wofford	**Soph.-Fresh.**	**2.888**	**2.883**			**2**
	Sr.-Jr.	**2.692**		**2.992**		**2**
Fairmont	**Soph.-Fresh.**	**4.929**				**1**
	Sr.-Jr.				**2.938**	**1**
Transylvania	**Soph.-Fresh.**	**2.604**				**1**
	Sr.-Jr.					**0**
Total	**Soph.-Fresh.**	**4**	**1**	**0**	**0**	**5**
Number	**Sr.-Jr.**	**1**	**0**	**1**	**0**	**3**
	All	**5**	**1**	**1**	**1**	**8**

*Expressed in t-values

Summary Statistics | 9

Data reported by the colleges are summarized in the charts which follow.

Each chart is arranged so as to show separately the data gathered each year of the project's existence. All twenty colleges completed two years of the project, but only twelve are represented in the third-year tables.

Total Computing Expenditures Summary: First Year-Figure 9.1:

Average first year expenditures per college for the nine colleges with terminals was $13,939; for the six colleges with their own IBM 1130, $57,052; and for the five sharing a small computer, $14,646. These are total costs and do not reflect discounts such as on machine rentals. However, such discounts were negligible for the institutions having terminals, nearly constant for the colleges with IBM 1130's at about $2,000 per 12 months, and averaged about $600 per college per year for the five colleges sharing an IBM 1130.

Total Computing Expenditures Summary: Second Year-Figure 9.1:

As can be seen, expenditures increased for the second year. The colleges with terminals had an average increase of approximately $2,000 (15%). Individual institutional expenditures in this group ranged from an increase of $8,000, due to primarily a significant change in computer time cost and secondly an increase in salaries, to a decrease of approximately $1,000. The colleges with their own IBM 1130 systems increased their expenditures nearly $13,000 on the average (22%). The five colleges sharing facilities had a total increase of almost $23,500 (32%) or $4,700 per institution.

In the case of the six colleges each operating its own IBM 1130 for a second year the most interesting figure is the average total expenditure of $70,047 after discounts (discounts on lease were fairly uniform at the time). This figure reflects the level of expenditure required to support such a facility.

Total Computing Expenditures Summary: Third Year-Figure 9.1:

Nine of the twelve institutions participating for a third year saw a decrease in expenditures, one was essentially the same, and two increased. It should be recalled that most of the NSF funds had been expended by the end of the second year and machine purchases occurred in some cases during the first and second years.

Type of Use: Figure 9.2:

In general, on the campuses with terminals, computer use is almost entirely for instruction. On campuses having their own stand-alone computer, administrative use is significant and increased during the three years from 29% to 42%. The total cost for these installations ranged from $50,000 to $100,000 after three years.

Estimated Percent of Students Participating: Figure 9.3:

The number of students participating increased at most of the colleges with a high increase of about 200%. Of the three colleges with decreases (all with terminals), one had a loss from 526 to 26. This seemingly large decrease merely reflects an attempt, in the first year, to expose all freshmen to the facilities. This effort was not attempted the second year.

Four institutions saw an increase in the number of students participating during the first two years followed by a leveling or decrease the third year. The other colleges saw a continued increase with the third year level being almost two to three times that of the beginning year.

The largest number of participating students, about one-third, was from mathematics and physical sciences while the least, less than one percent, was from biological sciences.

Percent of Faculty Participation: Figure 9.4:

Figure 9.4 shows the percentage of total faculty who participated in the computing activity. Overall the percentage did not change appreciably during the duration of the project. The percentages for all colleges combined for the three years were 12%, 11%, and 13% respectively.

Faculty participation among the various academic disciplines was relatively constant. Exclusive of programming and computer science courses, in which 100% participation is expected, participation was highest in mathematics and physical sciences. It increased over the three years in business but decreased in biological sciences. This decrease was probably not pervasive but rather the statistical effect of an isolated situation in which 50% of the faculty at one institution participated the first year but none participated the second year.

Total Number of Runs:

A "Run" interpreted as "Log on/Log off" for time-sharing is quite different from "a submission to the card reader" for batched processing. As a result comparisons between groups should not be made. Furthermore, operating procedures at individual colleges can affect the number of "runs" significantly.

Average Number of Runs Per Participating Student:

The comments made in reference to the total number of runs applies here as well. With exceptions at two colleges, the average number of runs per participating student decreased in the second year of operation. One explanation for this is that an experience factor built up in the student participants which made them less curious (they make fewer runs to see "what if. . .") and more efficient. The decrease may also reflect tighter scheduling of the computer facility and resulting changes in operating procedures.

Number of Console Hours: Figure 9.5:

Figure 9.5 gives some indication of the amount of time the computer facilities were in use. The data for the terminals in most cases represents on-line connect time. It does not indicate time involved in preparing programs or data off-line by punching paper tape. The data for the stand-alone computers is determined differently. In some cases it is identical to the CPU time as measured by the console elapsed-time meter. Some schools estimated the console hours from the CPU time using their own algorithm. Still others actually kept records of console hours using wall clock time. Again, caution must be used in interpreting the data in this figure. The most interesting numbers are the average hours per month. Only one of the colleges came near using one full shift (176 hours per month) during the first year.

Nine colleges showed substantial increases during the second year, but seven still were not close to the one full shift figure for instructional uses. Of the eight third-year installations most were still not close to the one full shift figure for instructional uses. During the third year one approached that level and the group of five exceeded it. When administrative uses are included, console hours increase considerably for most of the 1130 users, especially during the last year.

Average Number of Console Hours Per Participating Student:

Second year figures are more meaningful due to the experience factor and tighter scheduling mentioned previously. Each participating student averaged three hours of use at the colleges with terminals, one hour of use at the colleges with IBM 1130's, and four hours of use at the colleges sharing a computer. Third-year data were not significantly different.

CPU Time in Hours:

CPU time can only be compared within a specific model of computer and a certain sub-class of configurations. As a wide range of computer powers serviced the nine terminals, e.g., IBM 360/75, CDC 6600, IBM 360/40, GE 265, comparisons of the facilities can not be made.

Only two installations had a decrease, and that slight, in CPU hours used from the first to the second years, one remained the same, while the remainder increased as much as six times. Six of the seven providing third-year data also increased over their second-year results.

Ratio of Console Hours to CPU Hours:

Institutions with terminals purchased computer time from public service or commercial suppliers, and the billing hopefully contained accurate information on both the actual CPU seconds used as well as the console connect time. Second-year data from these institutions showed a significant decrease in console hours used per CPU hours with one exception. This decrease is primarily attributed to increased efficiency of use through experience and more sophisticated uses which place heavier demands on the CPU.

Unfortunately, institutions with their own computers were less able to determine a ratio. The IBM 1130 is not equipped with an internal clock. The time meter on the console advances whenever the machine is in use, including swap time, CPU time, and I/O time. Most of the institutions considered this to be inadequate and reported the total elapsed time read from the meter as both CPU and console time.

Average Costs Per Student Participating: Figure 9.6:

Average costs per participating student are based on those costs of the computer facilities which can be attributed to instruction and incidental research. Costs per year are grouped by major areas of instruction as well as by the now-familiar type of facility. Other variables involved are the number of console hours and the number of students participating.

Costs vary considerably. In programming courses they range from a low of $54 to a high of $353 for the first year. The first year mean for programming courses at all institutions is $232 and the median, $228. As would be expected, computer science and programming costs are highest of all the disciplines. At institutions with terminals, costs per student in programming courses nearly tripled those for any discipline during the first year.

Total average costs for the stand-alone computers are more than triple those for the terminals. The seemingly high total figure ($230) for the Group during the first year can be partially explained by the intensive use of the computer by students in programming, computer science, and social science disciplines.

If these costs appear high, even in their present context, the reader should bear in mind that few, if any, other aspects of college instruction are calculated on a user basis. Usually such costs as library operations are computed as average costs per student enrolled and not per student user.

Again, second- and third-year figures are of primary interest because they are more stable. Colleges using terminals averaged $39 per participating student during the second year while colleges with IBM 1130's averaged $59 per participating student during the same period. Although these costs declined in general each year, the seemingly large decline for the terminal institutions from the second to the third year is exaggerated due to the fact that it is based on data from only two, rather than nine, colleges.

Average Expenditure per Registered Student: Figure 9.7:

Figure 9.7 may be of the greatest interest to college administrators because it provides an easy "rule of thumb." Again, the second year data is most meaningful.

The nine institutions with terminals spent an average of $17 per registered student for computer facilities for instruction (research use was negligible; administrative use, nil). Some might argue that the usual number of terminals on a college campus can not possibly provide computer access to **all** registered students. The six colleges with their own stand-alone small computer (IBM 1130) averaged $28 per registered student for instructional and research uses and $16 per registered student for administrative uses. A stand-alone computer facility (IBM 1130) was made available to the five institutions for instruction and research at $18 per registered student or at about the same cost per registered student as a single terminal on each campus.

These averages can only be meaningful when examined simultaneously with threshold costs, i.e., approximately $15,000 per year is needed to support a terminal facility and approximately $50,000 is needed to provide a stand-alone computer such as the IBM 1130 for instructional and research uses. An additional $25,000 should be added to the base costs if administrative uses are included.

Figure 9.5

Average Console Hours Per Month

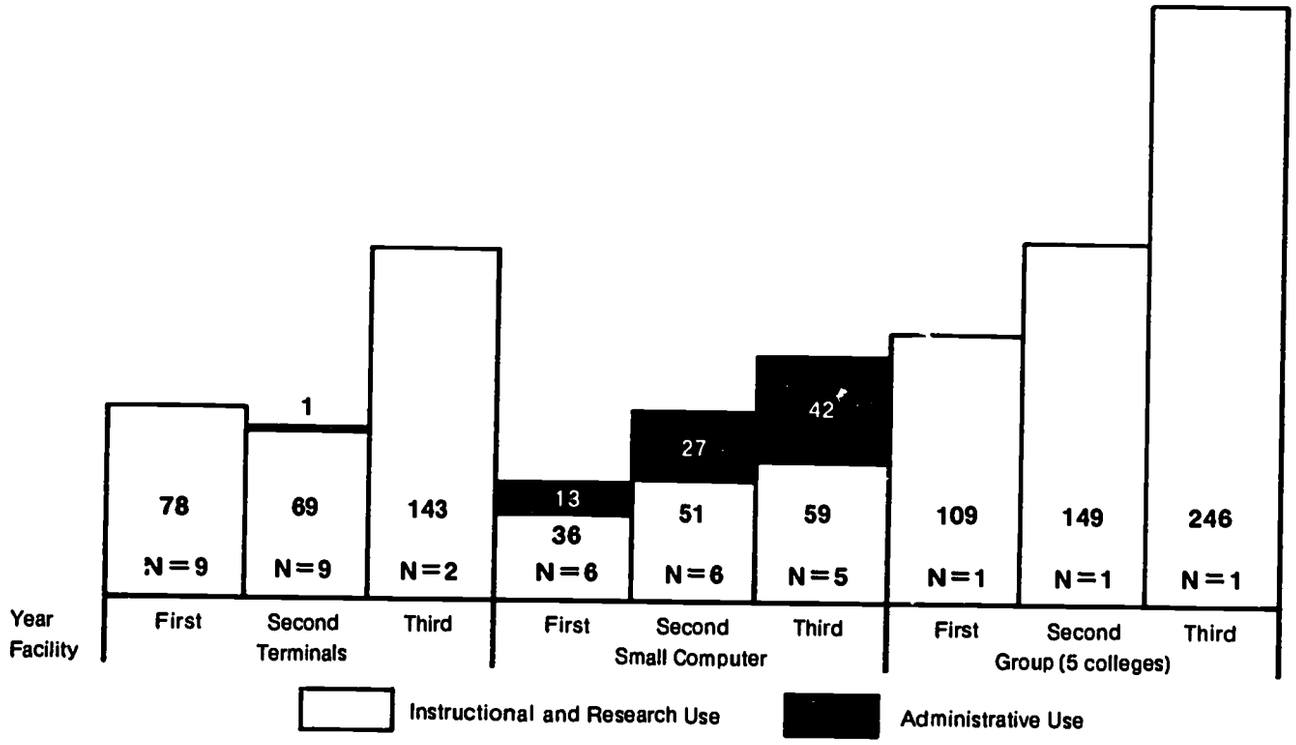


Figure 9.6

Average Costs Per Student Participating for Instructional Use

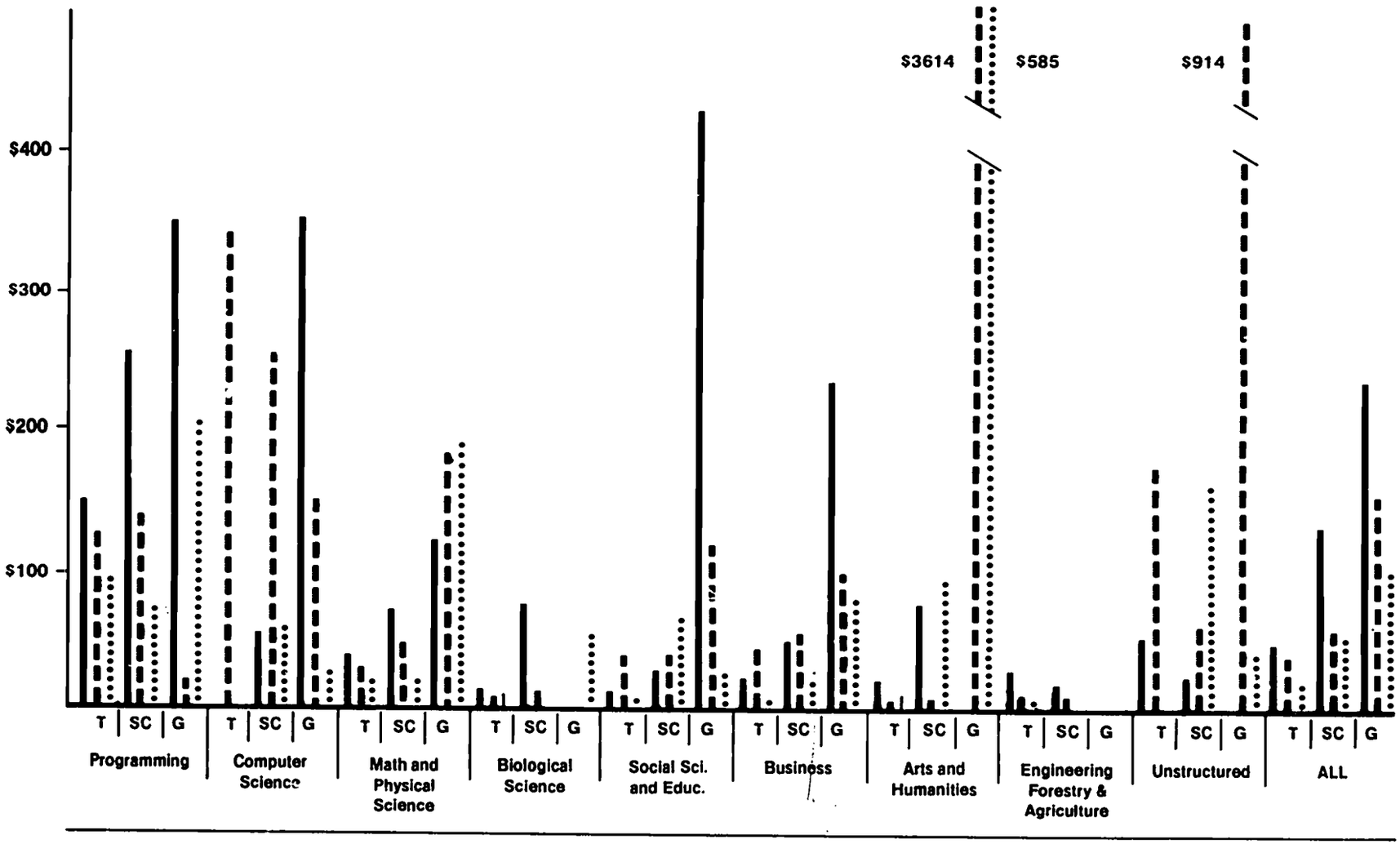


Figure 9.7

Average Expenditure Per Registered Student